AYAA TECHNOLOGY CO., LTD

Datasheet

6S 150A Lithium Battery Smart BMS

BMS Product Specification

Customer Name	**Shenzhen Ayaa Technology Co., Ltd**
Product Name	**EF-008**
Output Mode	**Power MOSFET**
Comm Interface	**CAN | UART | Type-C | BLE**
FCS	**PX4 & jiyiuav & VKCAN & SKYRCCAN & BOYINGCAN & DroneCAN (formerly UAVCAN/Cyphal)**
Date	**2026-03-23**

Table of Contents

1. Product Introduction **3**

2. Product Overview **3**

3. Configuration **4**

4. Parameter Settings **5**

4.1 Basic Parameters 5

4.2 Main Parameters 5

5. Bill of Critical Materials **11**

6. Product Diagram and Dimensions **12**

6.1 Product Photos and Interface 12

6.2 Interface Definition 12

6.3 Product Dimensions 14

7. Wiring Harness 14

8.1 Charge and Discharge Wiring Diagram 16

8.2 Temperature Sensor Installation 17

8.3 Electrical Wiring Instructions 17

8.4 Unpacking Inspection and Precautions 17

8.5 Wiring Harness Organization 18

8.6 Securing Connectors with Adhesive 23

8.7 Bluetooth/GPS Module Installation 24

8.8 Assembly Precautions 24

9. Disclaimer 25

10. Fault Diagnosis 25

1. Product Introduction

EF-006 smart drone BMS is designed for a 12-series lithium battery pack (NMC, 3.0–4.2V per cell) with charge and discharge sharing a single port. It supports continuous discharging current of 81A.

Temperature monitoring is handled by 3 NTC probes for the battery and 1 for the MOSFET. Communication options comprise isolated 485, UART, and CAN (standard), along with a Bluetooth module (115200 baud, ID:1) and CAN at 1000K baud.

It operates from −20°C to 70°C, and draws ≤10 mA in active mode and ≤50 μA in deep sleep (triggered by cell undervoltage). Pre-discharge and history storage functions are provided as standard.

2. Product Overview

The figure below shows the physical layout of the XTFY01-6S150AT BMS main board with key interfaces identified, including power terminals (B-, P-, H-), cell voltage sampling connector (J1), button/LED board interface (J3), CAN communication port (J4), and temperature sensor inputs.

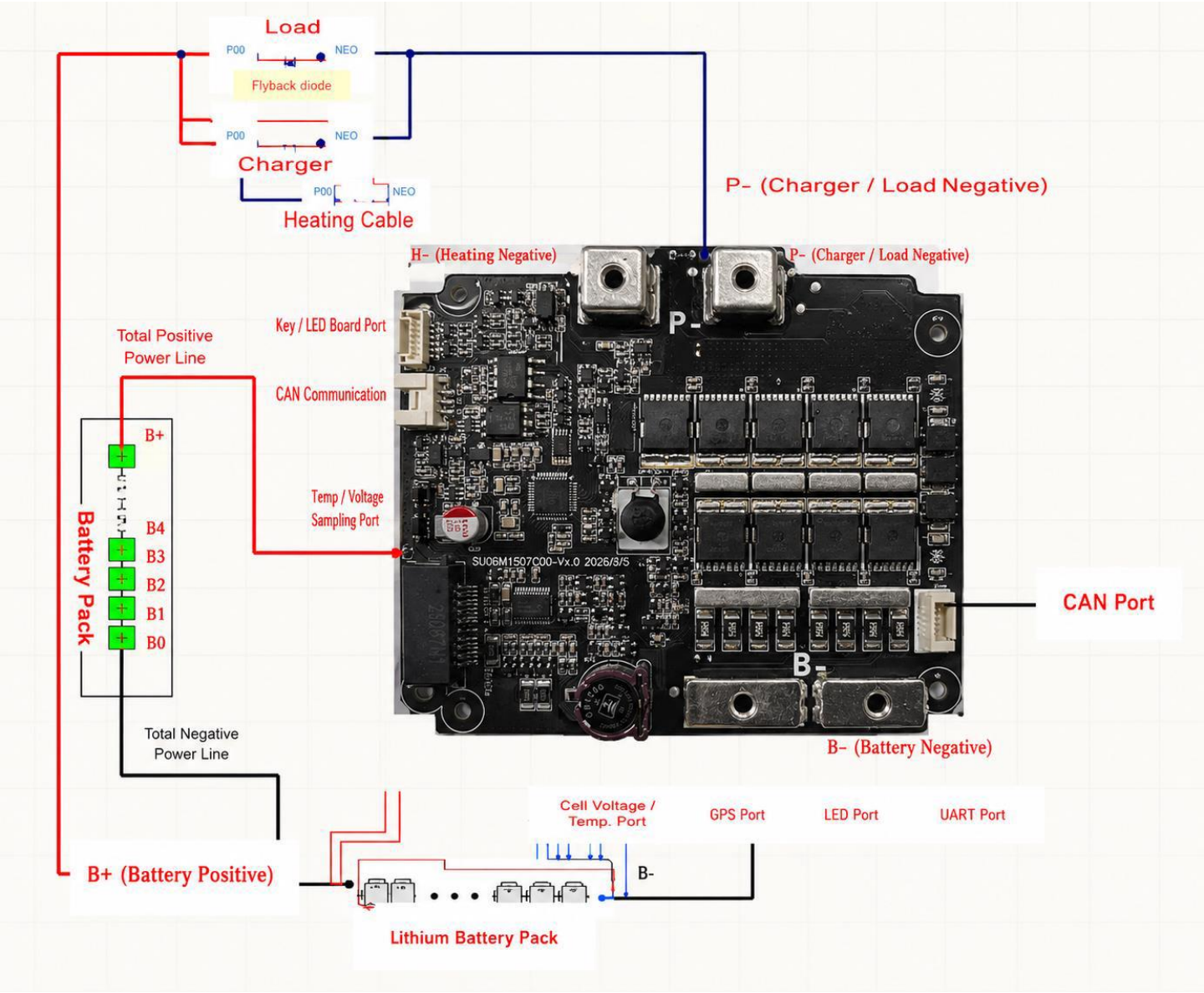

Figure 1: Product Overview — Main Board Interface Identification

3. Configuration

Function	Configuration	Function	Configuration
Number of Series Cells	6S	RS485 (Isolated)	/
Continuous Discharge Current	150A	UART	/
Continuous Charge Current	60A	CAN (Isolated)	Standard (without 120Ω resistor)
		Number of NTCs	3× Battery + 1× MOS
Heating Function	Reserved	Balancing Function	Passive Balancing
Bluetooth Module	/	Switch Function	Standard
Battery Packs in Series	/	Charge Current Limiting	/
Secondary Protection	/	Battery Packs in Parallel	Standard
LCD Display	/	History Storage	Standard
LED Indicator Interface	Standard	Pre-discharge Function	Standard
GPS Interface	/		

Note: Non-isolated communication does not support communication with chargers or loads.

4. Parameter Settings

4.1 Basic Parameters

Item	Specification
Battery Pack Configuration	6-Series Ternary Lithium
Interface Type	Common Charge/Discharge Port
Charge Voltage	4.40 V × Number of Cells
Cell Voltage Range	3.65 ~ 4.40 V
Continuous Charge Current	60 A
Continuous Discharge Current	150 A
CAN Baud Rate / ID	1 Mbps / ID: 1
Operating Power Consumption	≤ 30 mA
Sleep Power Consumption	≤ 2 mA
Sleep Condition	No current, no communication, no active protection
Deep Sleep Power Consumption	≤ 200 μA
Deep Sleep Condition	Cell under-voltage state
Operating Temperature	-30 °C ~ +70 °C
Board Dimensions (L × W × H)	130 mm × 95 mm × 15 mm ± 1 mm

4.2 Main Parameters

Cell Voltage Protection Parameters

Parameter	MIN	TYP	MAX	Unit
Over-Charge Warning Voltage	4.38 (Warning)	4.40 (Warning)	4.42 (Warning)	V
Over-Charge Protection Delay	2000	3000	4000	ms
Over-Charge Release Voltage	4.28	4.30	4.32	V

Ayaatech BMS Datasheet

Parameter	MIN	TYP	MAX	Unit
Over-Discharge Warning Voltage	3.63 (Warning)	3.65 (Warning)	3.67 (Warning)	V
Over-Discharge Protection Delay	500	1000	1500	ms
Over-Discharge Release Voltage	3.68	3.70	3.72	V

Balancing Parameters

Parameter	MIN	TYP	MAX	Unit
Balancing Activation Voltage	4.18	4.20	4.22	V
Balancing Activation Voltage Difference	0.03	0.05	0.07	V
Balancing Current	30	50	70	mA
Balancing Mode	Passive			

Ayaatech BMS Datasheet

Current Protection Parameters

Charge Over-Current Protection

Parameter	MIN	TYP	MAX	Unit
Over-Current Charge Protection	85	90	95	A
Over-Current Charge Protection Delay	5000	5000	5000	ms
Over-Current Charge Protection Release	Auto-recovery after 30 s delay; charger removal required after 3 consecutive triggers			

Discharge Over-Current Protection

Parameter	MIN	TYP	MAX	Unit
Level 1 Over-Current Protection	280 (Warning)	300 (Warning)	320 (Warning)	A
Level 1 Over-Current Protection Delay	400	600	800	ms
Level 2 Over-Current Protection	600 (Warning)	625 (Warning)	650 (Warning)	A
Level 2 Over-Current Protection Delay	10	20	100	ms
Over-Current Discharge Protection Release	Auto-recovery after 30 s delay; load removal required after 3 consecutive triggers			

Short-Circuit Protection Parameters

Parameter	MIN	TYP	MAX	Unit
Short-Circuit Protection Current	1000	1250	1500	A
Short-Circuit Protection Delay	40	100	400	μs
Short-Circuit Protection Release	Remove load to release			

Note: The minimum and maximum short-circuit current values define the effective operating range of the short-circuit protection function. Currents below the minimum or above the maximum may cause the protection to fail. Thoroughly evaluate the actual short-circuit current, or connect a series resistor, before performing short-circuit tests.

Cell Temperature Protection Parameters

Charge Temperature Protection

Parameter	MIN	TYP	MAX	Unit
Charge High-Temperature Protection	60	65	70	°C
Charge High-Temperature Release	50	55	60	°C
Charge Low-Temperature Protection	-10	-5	0	°C
Charge Low-Temperature Release	5	10	15	°C

Discharge Temperature Protection

Parameter	MIN	TYP	MAX	Unit
Discharge High-Temperature Protection	60 (Warning)	65 (Warning)	70 (Warning)	°C
Discharge High-Temperature Release	55	60	65	°C
Discharge Low-Temperature Protection	-25 (Warning)	-20 (Warning)	-15 (Warning)	°C
Discharge Low-Temperature Release	-20	-15	-10	°C

MOS Temperature Protection Parameters

Parameter	MIN	TYP	MAX	Unit
MOS High-Temperature Protection	85 (Warning)	90 (Warning)	95 (Warning)	°C

Parameter	MIN	TYP	MAX	Unit
MOS Temperature Release	75	80	85	°C

Ayaatech BMS Datasheet

Total Voltage Protection Parameters

Total Over-Voltage Protection (Overcharge)

Parameter	MIN	TYP	MAX	Unit
Total Overcharge Protection Voltage	26.28 (Warning)	26.40 (Warning)	26.52 (Warning)	V
Total Overcharge Protection Delay	2000	3000	4000	ms
Total Overcharge Release Voltage	25.68	25.80	25.92	V

Total Under-Voltage Protection (Over-Discharge)

Parameter	MIN	TYP	MAX	Unit
Total Over-Discharge Protection Voltage	21.78 (Warning)	21.90 (Warning)	22.02 (Warning)	V
Total Over-Discharge Protection Delay	500	1000	1500	ms
Total Over-Discharge Release Voltage	16.78	16.80	16.82	V

Heating Management

Parameter	MIN	TYP	MAX	Unit
Heating Activation Temperature	-5	0	5	°C
Heating Deactivation Temperature	5	10	15	°C
Heating Current		<5		A
Heating Mode	During charging only			

5. Bill of Critical Materials

No.	Component	Manufacturer	Package	Qty
1	GD32F103CBT6	GigaDevice	LQFP-48	1
2	BQ7693003DBTR	Texas Instruments	TSSOP-30	1

Note: To ensure supply chain security, we maintain alternative components of equivalent quality and specifications for all BMS materials, particularly for critical components. If certification requirements prohibit substitutions, or if customer approval is required before any change, please notify our sales team to submit a new sample for validation and confirm the updated specification.

6. Product Diagram and Dimensions

6.1 Product Photos and Interface

The figure below shows the BMS main board with cell voltage sampling and temperature sensor wiring connections overlaid, illustrating the correct wiring orientation for the J1 connector.

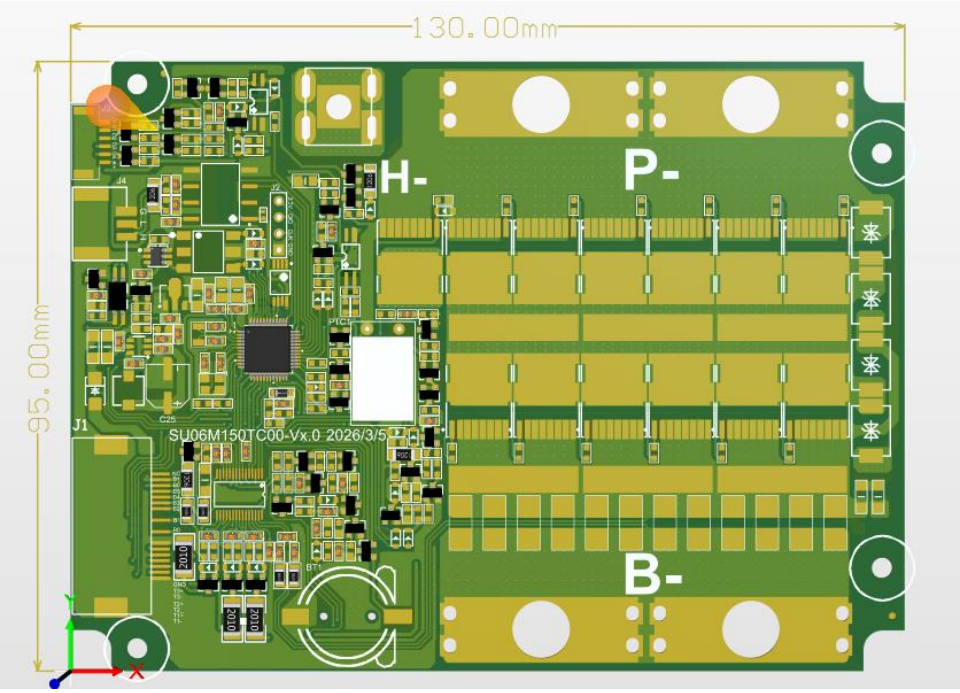

Figure 2: Wiring Interface Reference — Cell Sampling & Sensor Connections

6.2 Interface Definition

J1 — Cell Voltage Sampling Interface

No.	Pin	Function	No.	Pin	Function
1	NC	Not Connected	9	B0	Cell 1 Negative
2	VB+	Cell 6 Positive (Total Positive)	10	GND	Cell 1 Negative (Ground)
3	B6	Cell 6 Positive	11	T3+	Temperature Sensor 3 Positive
4	B5	Cell 5 Positive	12	T3-	Temperature Sensor 3 Negative
5	B4	Cell 4 Positive	13	T2+	Temperature Sensor 2 Positive
6	B3	Cell 3 Positive	14	T2-	Temperature Sensor 2 Negative

No.	Pin	Function	No.	Pin	Function
7	B2	Cell 2 Positive	15	T1+	Temperature Sensor 1 Positive
8	B1	Cell 1 Positive	16	T1-	Temperature Sensor 1 Negative

J3 — Button/LED Board Interface

No.	Pin	Function
1	GND	Button & LED Common Ground
2	D1	LED 1 Positive
3	D2	LED 2 Positive
4	D3	LED 3 Positive
5	D4	LED 4 Positive
6	K+	Button Positive

J4 — CAN Communication Interface

No.	Pin	Function
1	CGND	CAN Isolated Power Ground
2	L	CAN-L
3	H	CAN-H

6.3 Product Dimensions

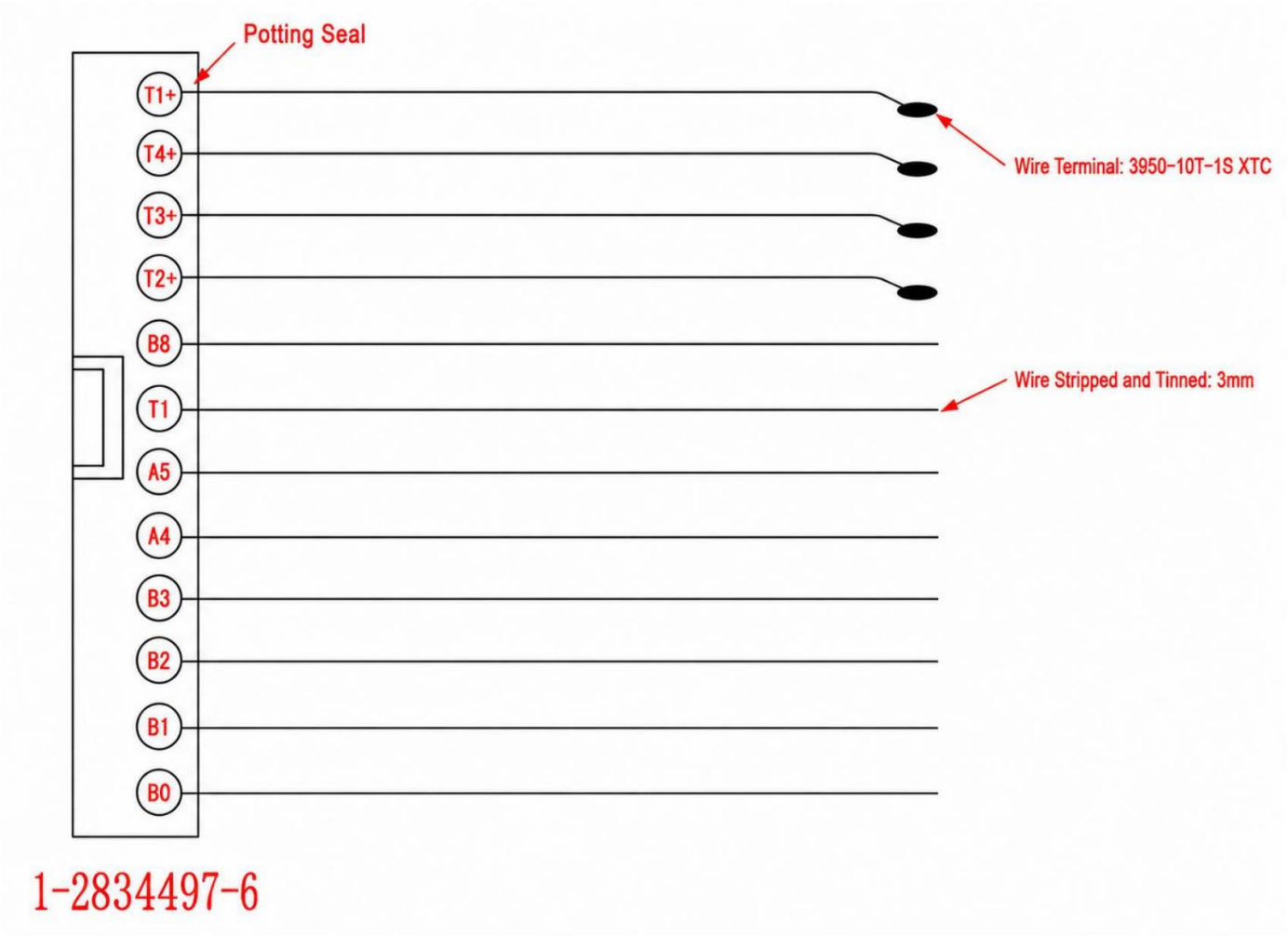

Figure 3: Product Dimensions (130 × 95 mm)

7. Wiring Harness

7.1 Cell Sampling Cable

1-2834497-6 / UL3266-24AWG / 150 mm / XTFY01 / with 3950-10k-1% NTC

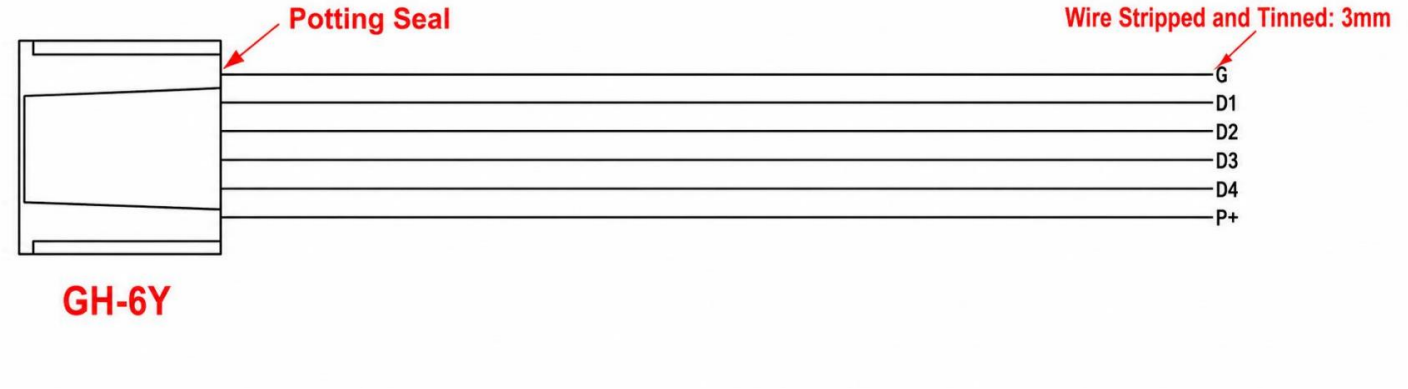

Figure 4: Cell Sampling Cable Definition

7.2 Button/LED Board Cable

GH-6Y / UL3266-28AWG / 100 mm / SCQL01

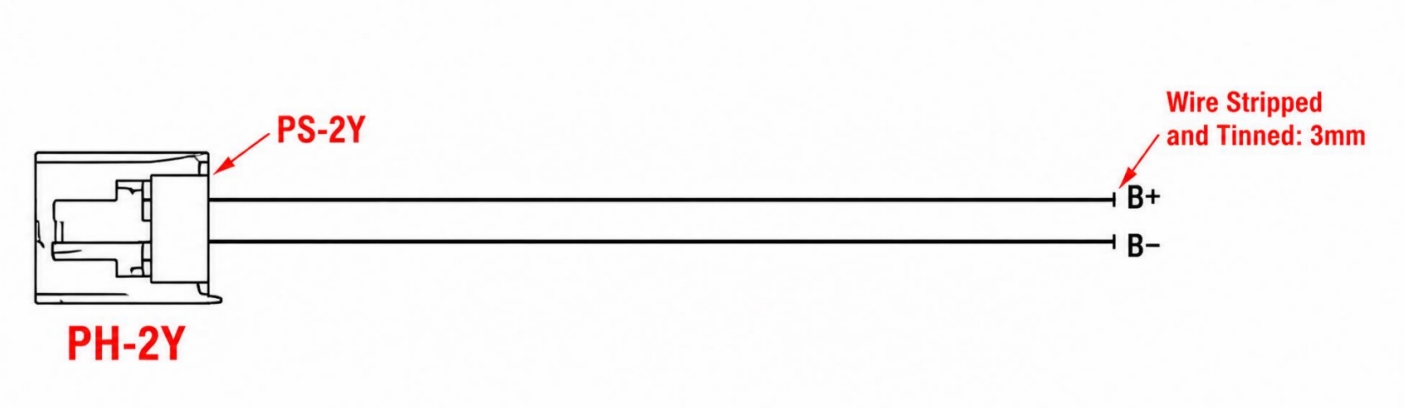

Figure 5: Button/LED Board Cable Definition

7.3 CAN Communication Cable

PHB-3Y / UL3266-24AWG / 150 mm / XTFY01 / CAN Communication

8.1 Charge and Discharge Wiring Diagram

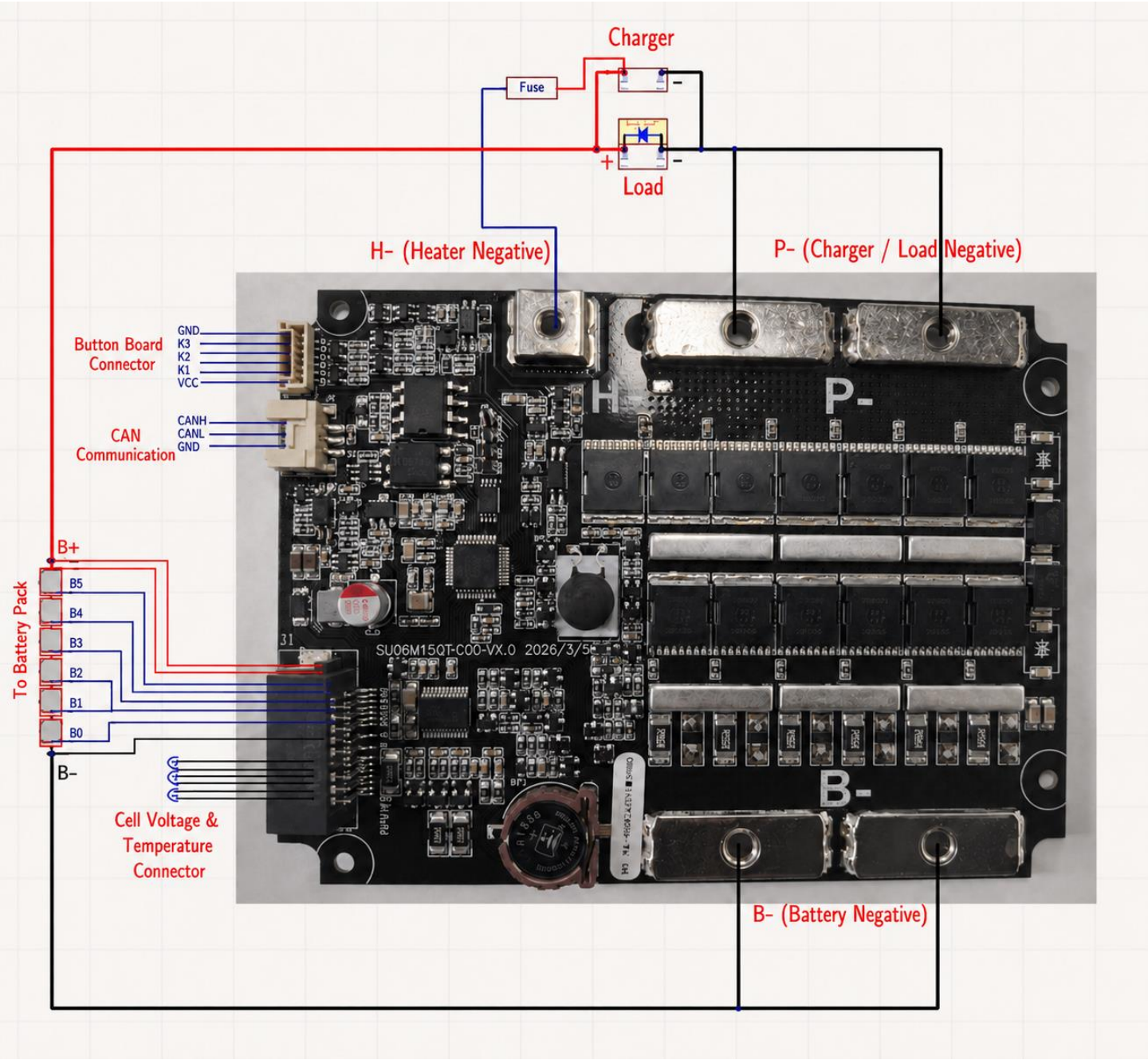

Figure 6: Charge and Discharge System Wiring Diagram (Charger, Load, H-, P-, B-)

Power-Up Sequence:

Step 1: Connect the main board "B-" terminal to the negative terminal of the battery pack.

Step 2: Connect the temperature sensor cables, CAN communication cable, and start signal cable.

Step 3: Connect the cell voltage sampling cable.

Step 4: Connect the "P-" power wire to the negative terminal of the load or charger, or connect the "C-" power wire to the charger negative.

Step 5: After confirming all connections are correct, short-circuit the "K+" and "K-" signals for 1 second. The BMS will power up and begin self-testing. If the status LED blinks at 1 Hz, the system is operating normally. If the LED blinks at 3 Hz, a fault (e.g., over-voltage, under-voltage, or over-temperature) has been detected and an alarm is active.

Power-Down Sequence:

Step 1: Disconnect the charger and load.

Step 2: Disconnect the voltage sampling cable.

Step 3: Disconnect all communication cables.

Step 4: Disconnect the main board B-.

Note: If the voltage sensing cable uses soldered connections:

A) Pre-tinning: Place the BMS on an anti-static surface. Apply solder to the pads before connecting wires. If the incoming wires are not pre-tinned, tin them beforehand to minimize soldering time while the board is live.

B) Soldering sequence: Solder cell sensing wires in the order B1 → B2 → ... → B+. Verify all connections before powering on.

C) Avoid contacting surrounding components or PCB traces during soldering.

8.2 Temperature Sensor Installation

The on-board temperature sensors monitor battery pack temperature. During installation, ensure the sensor probe is firmly attached to a cell located at the center of the battery pack, where temperature concentration is highest.

8.3 Electrical Wiring Instructions

When connecting the BMS to the battery pack, first connect the overall negative terminal of the battery pack to the B- terminal of the BMS to ensure reliable system grounding. The impedance of the power cable between the battery pack negative and the BMS B- terminal should be kept as low as possible — within 0.1 mΩ — to maintain current detection accuracy during high-current charge and discharge operations.

When conducting charge or discharge tests at currents exceeding 50 A, both the B- and P- power lines on the main board must be fully connected to ensure over-current capability and to guarantee current sharing among power devices.

8.4 Unpacking Inspection and Precautions

Before opening the package, verify that the packaging is intact, checking for any signs of impact or damage. Handle the packaging and BMS with care, and avoid inverting the package.

Before installing the BMS, ensure that the battery cells are properly matched. Excessively high or low cell voltages will trigger a BMS alarm and prevent normal operation. If any cell is over-charged or over-discharged, adjust the cell voltage to within the normal range before connecting the BMS.

8.5 Wiring Harness Organization

8.5.1 Power Line Separation

B-, P-, B+, P+, and heating (H+, H-) power lines are independent output lines. Do not bundle them together with signal cables.

8.5.2 Communication Cable Separation

Outgoing communication cables must be bundled separately from local communication cables. For example, external RS485, CAN, 12 V activation signals, and low-current switch signal lines must not be bundled with local Bluetooth, GPS, voltage sampling, temperature sampling, display, or LED board cables.

8.5.3 Straight Wiring

The cable tie point should be positioned at a distance equal to the connector width from the connector.

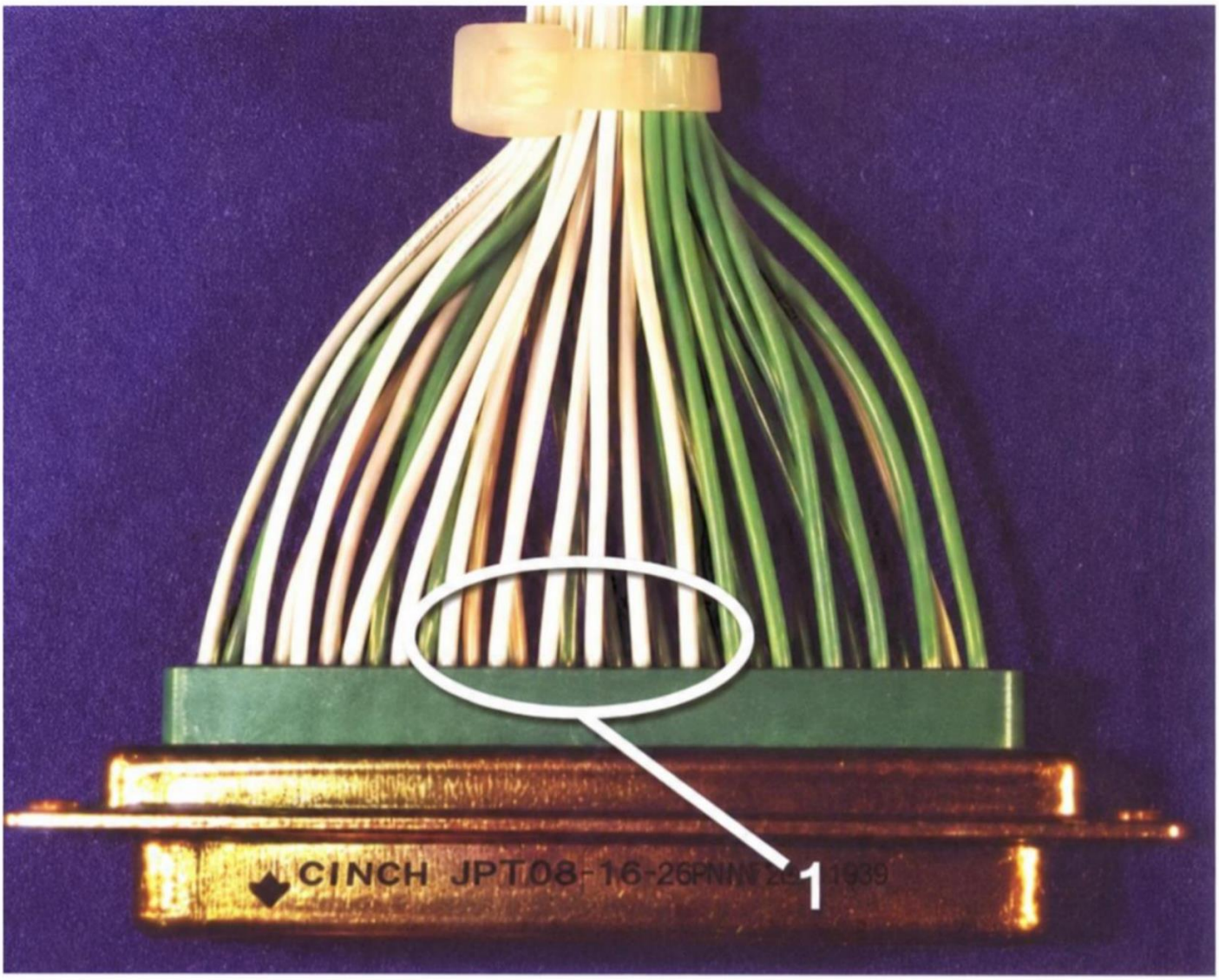

Figure A (Area 1 is the High-Stress Region)

Figure 7: Straight Wiring — Target (A)

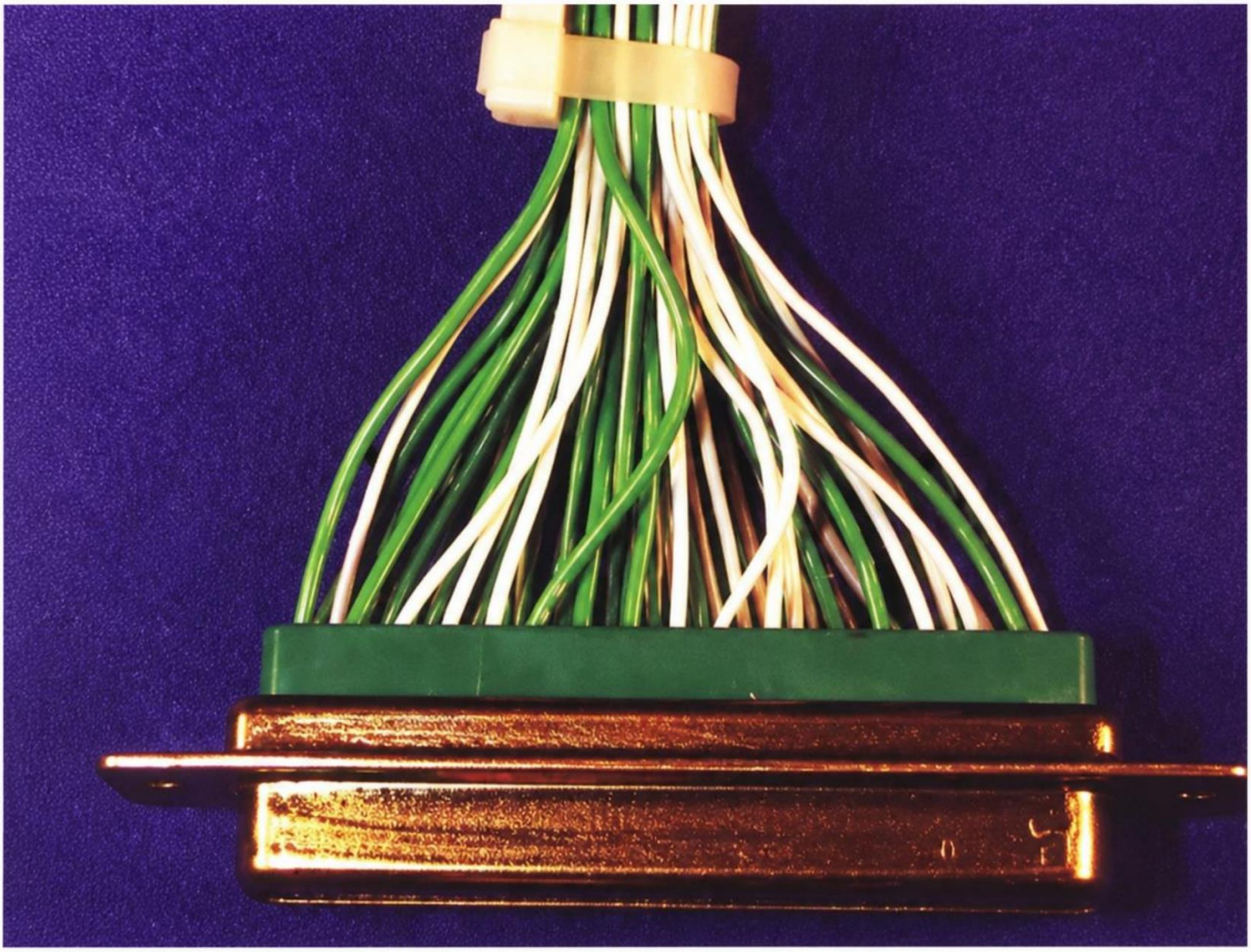

Figure B

Figure 8: Straight Wiring — Acceptable (B)

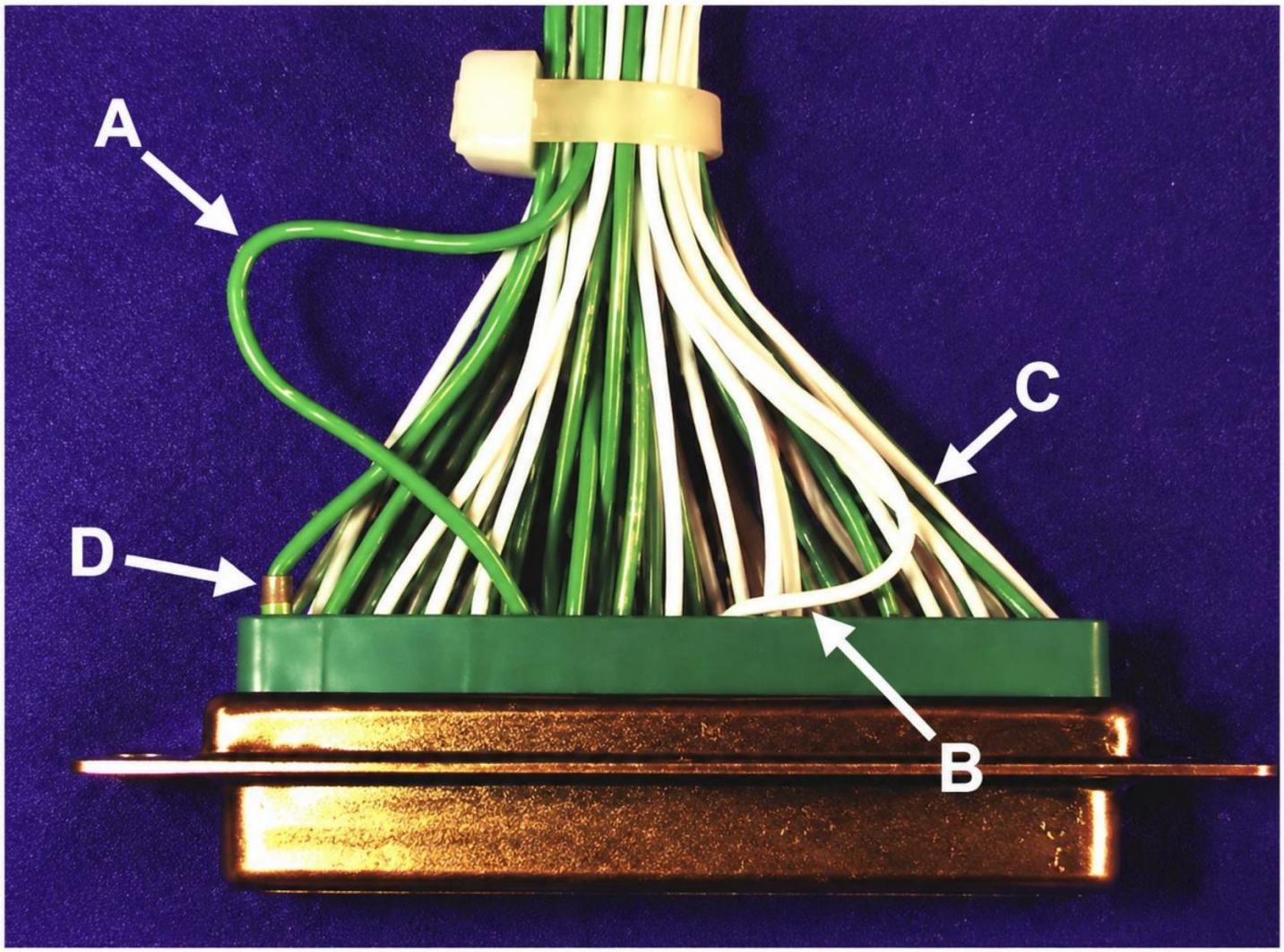

Figure C

Figure 9: Straight Wiring — Not Acceptable (C)

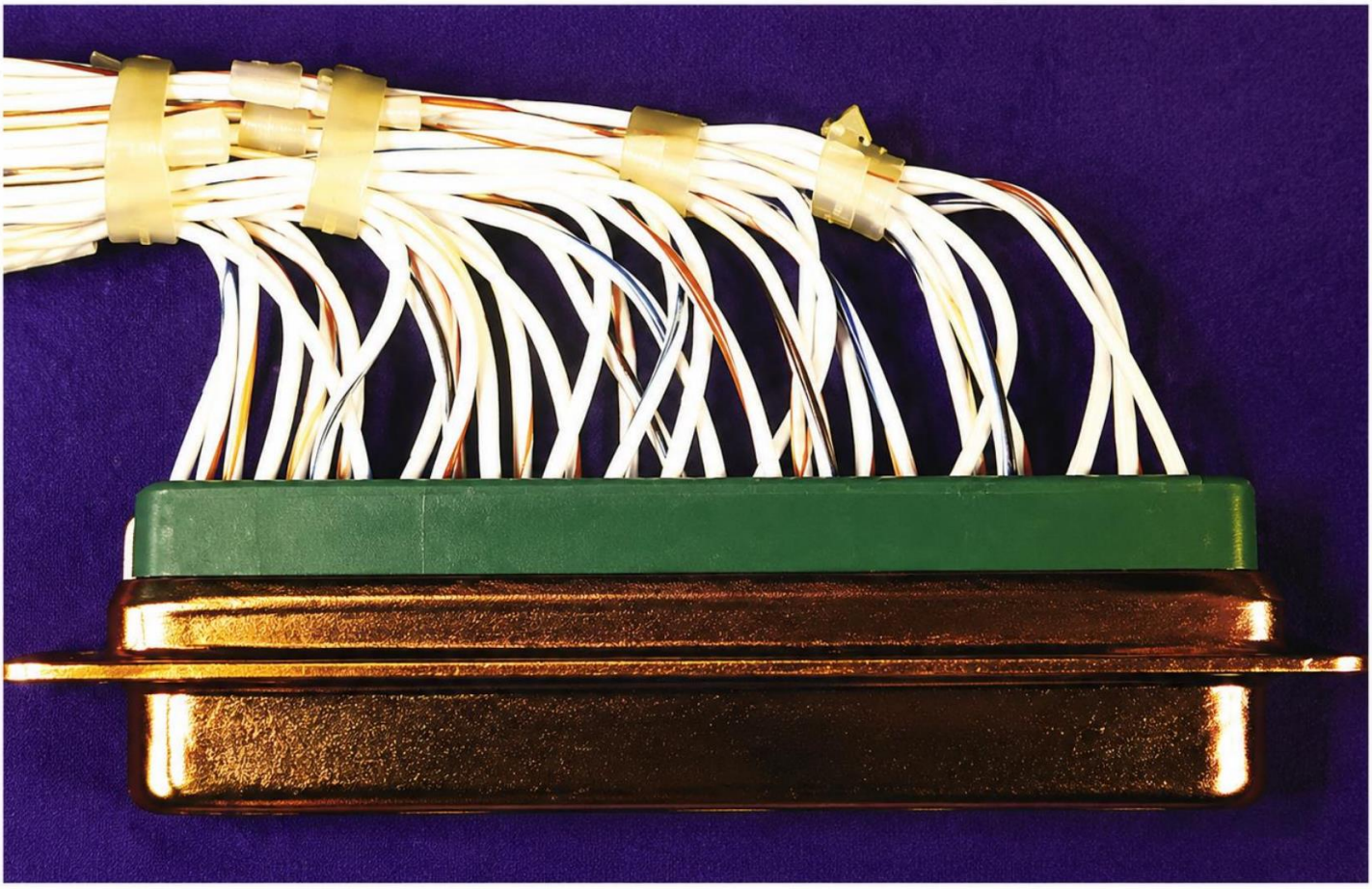

Figure A

Figure 10: Lateral Wiring — Target (A)

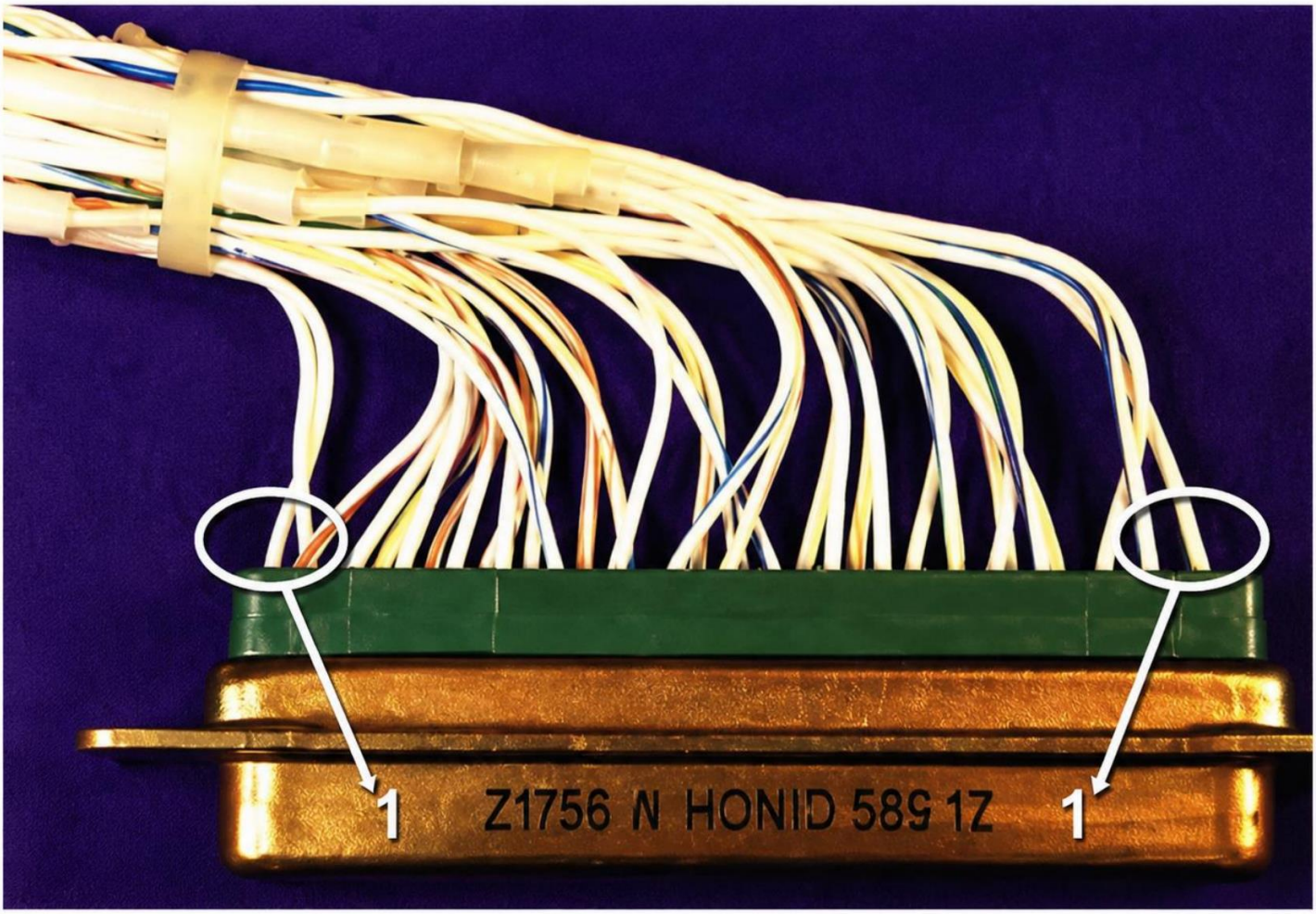

Figure B (Area 1 is the High-Stress Region)

Figure 11: Lateral Wiring — Acceptable (B)

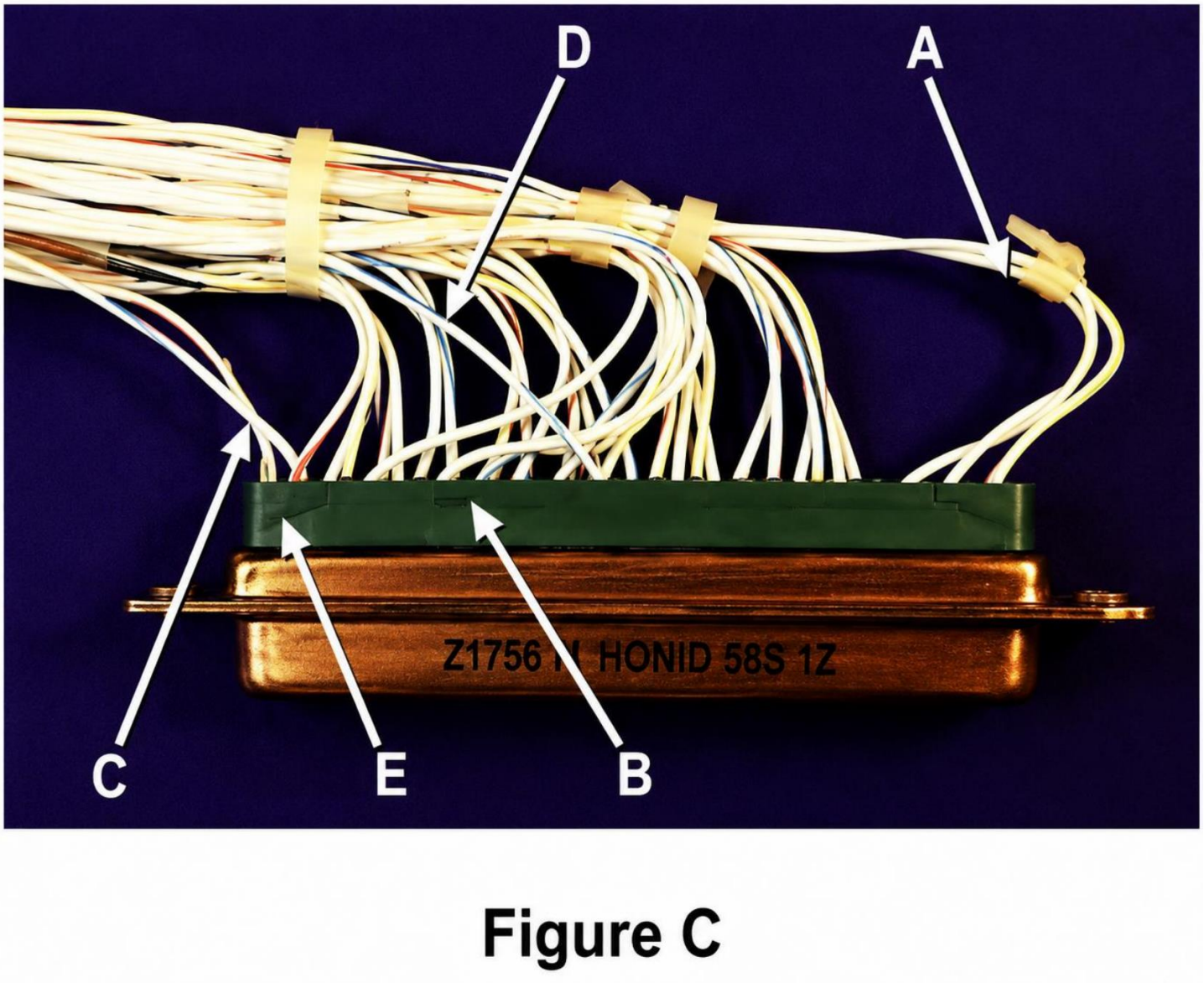

Figure 12: Lateral Wiring — Not Acceptable (C)

8.5.4 Lateral Wiring

The bending point of the wiring harness should be located at approximately 1/3 of the connector width.

8.5.5 Wire Harness Fixation

The wire harness must be securely fastened to the enclosure or mounting plate using clips or cable ties. Wiring should be neat and firmly secured — no loose or hanging wires, no interference or mechanical stress, and no abrasion. A fixation point must be present within 30–50 mm of each connector, and the spacing between fixation points must not exceed 200 mm. Fixation points should be located within 80 mm on either side of any corner or edge.

8.6 Securing Connectors with Adhesive

After wire harness installation, ensure the connector latch is fully seated. It is recommended to apply flame-retardant red or yellow adhesive (hard type) at the junction between the wire harness housing and the BMS connector, as well as around the latch. Apply adhesive to both the front and back of the connector.

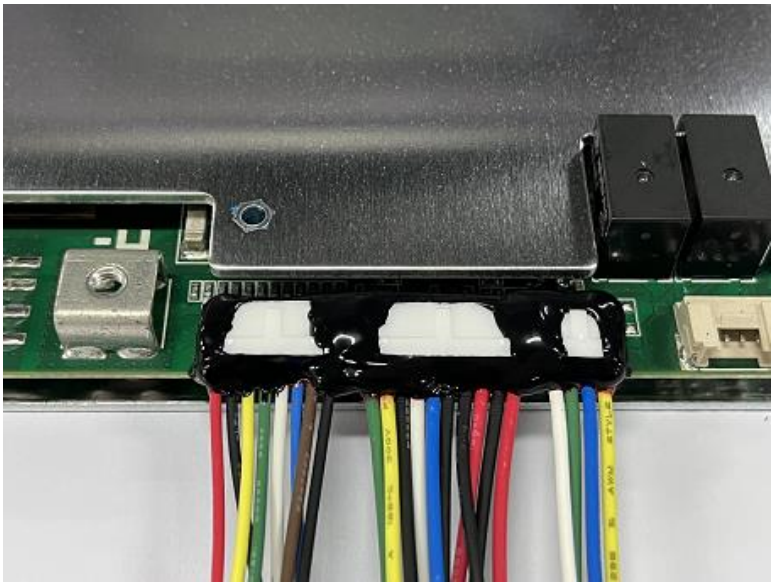

Figure: Connector Adhesive Application Example

Important Note:

Since motor controllers are equipped with freewheeling protection devices, the BMS board does not include high-power freewheeling diodes. When using a large-scale charge/discharge test cabinet for discharge testing, a freewheeling protection diode must be connected in parallel at the cabinet output to prevent inductive voltage spikes at the moment of discharge shutdown. A 200 V / 100 A Schottky diode is recommended. Failure to install this diode may result in inductive voltage damage to the BMS power components.

8.7 Bluetooth/GPS Module Installation

The Bluetooth/GPS module is an independent unit. To ensure adequate signal strength, verify that the Bluetooth/GPS antenna is not shielded or obstructed by any metal enclosure.

8.8 Assembly Precautions

• Prevent electrostatic discharge (ESD) during assembly and use. Do not touch conductive areas of the circuit board with bare hands. Ensure soldering irons and power tools are properly grounded.

• Avoid applying mechanical stress to the circuit board during assembly and use, as this may damage electronic components and cause board failure.

9. Disclaimer

Failure to follow the specified procedures may damage the protection board components, rendering the board unable to protect the battery cells. The user bears full responsibility for any consequences resulting from non-compliance with the prescribed procedures.

10. Fault Diagnosis

Common baud rate and BMS ID combinations:

125K/1, 125K/20, 250K/1, 250K/20, 500K/1, 500K/20, 1000K/1, 1000K/20

1. Smoke or burning smell when connecting the voltage sampling cable

1) Immediately disconnect the voltage sampling cable and verify that the cell-side wiring is soldered in the correct sequence: B0, B1, B2, ... up to the last cell. No sequence errors or cold solder joints are permitted.

2) For BMS boards with multiple voltage sampling interfaces, ensure the low-position harness is connected first, then the high-position harness. When disconnecting, remove the high-position harness first, then the low-position harness.

3) Check for any exposed wires causing short circuits, or solder beads that may have fallen onto the board.

2. BMS board does not power on

1) Check whether the status LED is illuminated. If not, try activating the BMS via the power button or by applying a charge voltage. A 1 Hz flash indicates normal operation; a 200 ms fast flash indicates an alarm or protection event (connect via host software or Bluetooth to diagnose). A single flash every 10 seconds indicates sleep mode — apply charge or discharge to wake.

2) A constantly lit LED typically indicates accidental entry into the firmware upgrade mode. Re-run the firmware upgrade to resolve.

3. Battery pack does not discharge

1) In normal operating mode with no output, check if an external weak-current switch is configured. Try pressing the external switch. Alternatively, connect via Bluetooth or host software and verify the discharge MOS status: "1" indicates the MOS is conducting (discharge enabled); "0" indicates the MOS is open (discharge disabled).

2) No output in sleep mode is expected — sleep mode disables output to conserve power. If a weak-current switch is available, try waking the BMS via the switch, or apply charge/discharge to resume normal operation.

3) If the status LED flashes at 200 ms intervals, the battery has an abnormality and the BMS has activated protection, shutting off output. Connect via communication or Bluetooth APP to diagnose — prioritize checking for voltage, current, or temperature protection events.

4) Verify whether a previous protection event has occurred and the recovery conditions have not yet been met.

4. Battery pack does not charge

1) Verify charger compatibility. Basic (blind) chargers that output voltage as soon as mains power is connected must have an output voltage equal to or greater than the battery pack's full-charge voltage. A charger with lower output voltage than the battery pack cannot charge it.

2) When using charge/discharge aging cabinets, note that some chargers require battery voltage identification first. Protocol chargers may be incompatible and unable to charge.

3) Verify that the charger output voltage is approximately 1.2 V above the current battery pack voltage. When the battery is nearly full, the charger may not be recognized or may not initiate charging — this is normal behavior.

4) Some BMS boards feature a weak-current switch that controls charging. Try pressing the external switch to enable charging.

5. Voltage sampling cable overheating

1) Verify that the voltage sampling cable terminations are correctly connected to the cells, and that the high/low sequence is not reversed. Incorrect connections cause heating and may damage internal board circuits and components.

2) Verify that the number of cells in the harness matches the BMS board's factory configuration. Mismatched harnesses or incorrect series connection usage will cause overheating and may damage internal circuits and components.

6. Voltage of one cell varies significantly with charge/discharge current, causing increasing voltage difference from adjacent cells

1) Check whether the bus bars connecting the affected cell to adjacent cells are securely welded.

2) Check whether the voltage sampling wire for the affected cell is securely soldered.

3) Check whether the internal resistance of the connecting bus bars between the affected cell and adjacent cells is abnormally high. Soft copper bus bars are strongly recommended for inter-cell and inter-pack connections — do not use power cables.

7. Power loss when connecting load or inverter

1) Check whether the battery voltage is too low, triggering the BMS over-discharge protection. Connect the host software or Bluetooth APP to diagnose.

2) Check whether the load or inverter power is excessive, triggering the BMS over-current protection. Connect the host software or Bluetooth APP to diagnose.

3) Check whether the device has large capacitors that may trigger the BMS over-current or short-circuit protection. Connect via communication or Bluetooth APP to diagnose.

8. Power loss during acceleration or uphill driving

1) Check whether the BMS over-current protection has been triggered. Connect the host software or Bluetooth APP to read alarm and operational data, then optimize protection parameters accordingly.

2) Verify that the battery has sufficient charge and that under-voltage protection has not been triggered.

3) Check whether the power cables are securely soldered.

9. Bluetooth connection failure

1) Check whether the Bluetooth APP can detect the module name. If found, the BMS is operating normally. If not, the BMS may be in sleep mode or under-voltage protection.

2) Check whether the Bluetooth module has a flashing green LED, indicating normal power supply. If not, verify the interface wiring.

3) A constantly lit Bluetooth module LED indicates the phone has paired with the module. If data is displayed, the connection is normal. If the LED is lit but no data appears, there may be a configuration error — try changing the ID to 1 or 20 in the phone app.

4) Verify that the phone's Bluetooth function is enabled. Try swiping down to refresh the search screen multiple times. For Android devices, ensure location services are also enabled.

10. CAN communication connection failure

1) Verify the CAN communication adapter brand. The Chuangxin Technology brand is recommended — other brands may experience connectivity issues.

2) Verify that the driver is installed on the computer. Plug and unplug the CAN device's USB connector and observe the Device Manager. The device should appear when plugged in and disappear when unplugged. A warning icon indicates a driver installation issue.

3) Verify that the DIP switch on the CAN adapter is set correctly. A one-up-one-down configuration is generally recommended.

4) Verify that the BMS signal definitions (H and L) match the communication adapter correctly. Ensure that the wiring terminal screws make contact with the conductor, not just the insulation.

5) Prioritize connecting to the CAN1 port of the CAN adapter. CAN2 has different host software settings.

6) Check whether multiple host software instances are open. Close other CAN software or debug tools to avoid device conflicts.

7) Verify the CAN settings: Device = CANalyst-II, Baud Rate = refer to specification, BMS ID = refer to specification, all other values = default. Click Connect and Start Acquisition after configuration.

11. RS485 communication connection failure

1) Verify that the driver is installed on the computer. Plug and unplug the RS485 device's USB connector and observe the Device Manager. The serial port should appear when plugged in and disappear when unplugged. A warning icon indicates a driver issue.

2) Verify that the BMS signal definitions (A and B) match the communication adapter correctly. Ensure wiring terminal screws contact the conductor, not just the insulation.

3) Check whether multiple host software instances or debug tools are open. Close them to avoid serial port conflicts.

4) Verify the settings: Select the correct COM port, Baud Rate = refer to specification, BMS ID = refer to specification, all other values = default. Click Connect and Start Acquisition after configuration.

12. UART/Serial communication connection failure

1) Verify that the driver is installed on the computer. Plug and unplug the serial device's USB connector and observe the Device Manager. The serial port should appear when plugged in and disappear when unplugged. A warning icon indicates a driver issue.

2) Verify that the BMS signal definitions (TXD, RXD, GND) match the communication adapter correctly. Ensure wiring terminal screws contact the conductor, not just the insulation. Typically, the BMS TXD corresponds to the adapter TXD and RXD to RXD, though some models require cross-connection.

3) Check whether multiple host software instances or debug tools are open. Close them to avoid serial port conflicts.

4) Verify the settings: Select the correct COM port, Baud Rate = refer to specification, BMS ID = refer to specification, all other values = default. Click Connect and Start Acquisition after configuration.

Common baud rate and BMS ID combinations (RS485/UART):

9600/1, 9600/20, 115200/1, 115200/20