RePower 瑞能

Professional battery testing systems

Repower PCBA Tester Technical Specification

Model: PCBA-32S 300A

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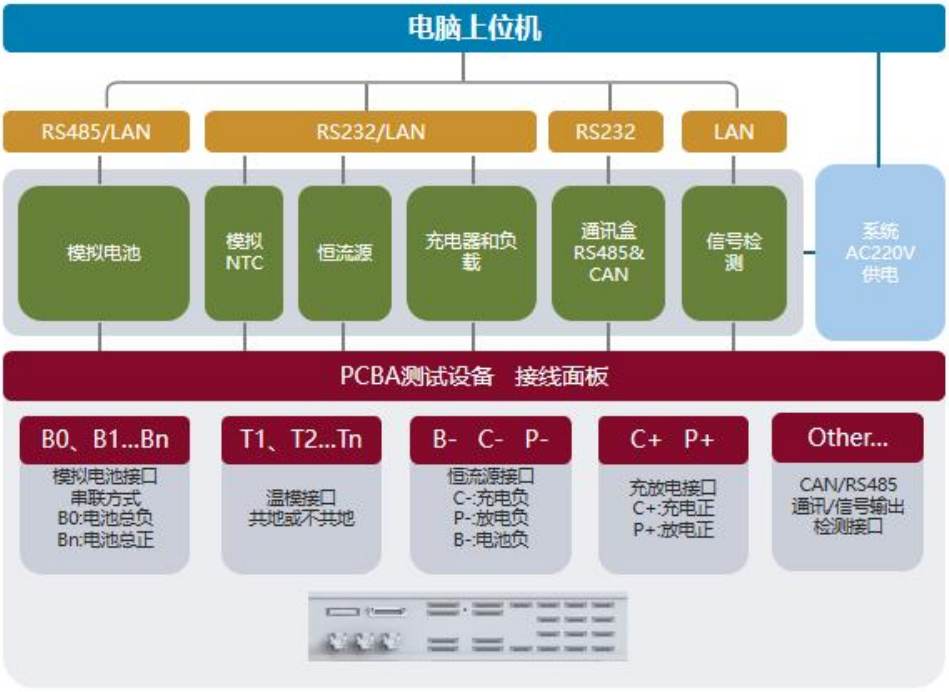
1. Equipment Overview

The RePower Protection Board Test System consists of a simulated battery, charge-discharge system, temperature simulation and detection unit, signal detection unit, communication unit, and host computer software. It can fully test the protection board (BMS) for self-consumption, protection functions, communication functions, balancing functions, conduction resistance, charge-discharge functions, etc. The test results can determine whether the product meets the qualification criteria and flag defective products. The system can store test results and integrate with the Manufacturing Execution System (MES) for data management and traceability.

This equipment is primarily used in the production testing of power battery pack protection boards (BMS), incoming material inspection, quality control, and R&D testing.

2. Equipment Topology Diagram



3. Main Testing Items

3.1 Applicable Range and Main Testing Items

Product Name	Power Protection Board Test System
1.Application	Capable of testing 3~32 series power lithium battery pack protection boards with support for future upgrades.
2.Testing Items	
2.1	Open Circuit Voltage Test
2.2	Overcharge Voltage Verification
2.3	Undervoltage Protection Verification
2.4	Total Static Current Measurement

2.5	Single-Cell Static Current Measurement
2.6	Balancing Activation Voltage Measurement
2.7	Balancing Current Measurement
2.8	Balancing Deactivation Voltage Measurement
2.9	Total Overvoltage Protection Measurement
2.10	Total Overvoltage Recovery Measurement
2.11	Total Undervoltage Protection Measurement
2.12	Total Undervoltage Recovery Measurement
2.13	Single-Cell Overcharge Delay Measurement
2.14	Single-Cell Overcharge Voltage Protection Measurement
2.15	Single-Cell Overcharge Recovery Voltage Measurement
2.16	Over-discharge Protection Delay Measurement
2.17	Single-Cell Over-discharge Voltage Protection Measurement
2.18	Single-Cell Over-discharge Recovery Voltage Measurement
2.19	Charge Protection Current Measurement
2.20	Discharge Protection Current Measurement
2.21	• **Overcurrent Protection Delay Measurement**
2.22	• **Secondary Overcharge Protection Delay Measurement**
2.23	Single-Cell Secondary Overcharge Voltage Protection Measurement
2.24	Single-Cell Secondary Overcharge Recovery Voltage Measurement
2.25	Load Impedance Test (Main Circuit DC Internal Resistance of the Protection Board)
2.26	Over-temperature and Recovery Tests for Charging and Discharging
2.27	Low-temperature Protection and Recovery Tests for Charging and Discharging
2.28	Short-Circuit Protection Test (Max Current 300A, ≥150A for a maximum duration of 30s)
2.29	**DO Function Measurement**: Supports testing of BMS output signals of 3.3V, 5V, and 12V, and compares them with the BMS DO status information.
2.30	**DI Function Measurement**: Supports providing 3.3V, 5V, and 12V signals to the BMS and comparing them with the information from the host computer. It also supports pulling down the BMS DI high-level signal to 0V, then performing a comparison test with the BMS DI status information.
3.BMS Communication Function	Supports comparison testing of mainstream communication protocols such as One-Wire, RS485, and CAN.
4.Secondary Development Features	Offers support for secondary development with dynamic libraries and script editing.

5.Test Program Activation	Supports test activation via barcode scanning, button press, or manual initiation.
6.**Test Data**	Can generate data tables for local backup and upload test data to the MES system.
7.Compatibility	Supports testing of protection boards for lithium-ion batteries of various chemistries (LFP, NMC, LCO, LMO, LTO) in 4-24 series configurations.
	It is compatible with both hardware and software protection boards, supporting both same-port and different-port testing.

4. Equipment Components and Technical Parameters

4.1 Equipment Components List

No.	Component Name	Model Specification	Quantity	Remarks
1	Simulated Battery	RP-5V1A	32CH	
2	Temperature Simulation Module	RP-RES-CK-01	8CH	Simulated temperature
3	Charge-Discharge System	RP-5V300A/120V0.5A	1unit	Simulated charging
4	Signal Integration Module	/	1unit	Signal detection
5	CAN Communication Box	USBCAN-2E-U	1CH	
6	RS485 Communication Box	RP-RS485	1CH	
7	Cabinet	Custom-made	1Unit	For module installation
8	Computer	i5/16G/500G	1Unit	Includes display
9	Software System	Test Software	1Set	

4.2 Equipment Technical Parameters

No.	Unit Name	Model Specification	Technical Parameters
1	Simulated Battery Unit	5V1A	1) Voltage output measurement range: 0.15V; 2) Voltage resolution: 0.1mV; 3) Voltage output accuracy (@25±10℃): ±0.05% FS;

			4) Voltage measurement accuracy (@25±10℃): ±0.05% FS; 5) Current output measurement range: -1~1A, 1~5000μA; 6) Current resolution: 0.1mA/0.1μA; 7) Current output accuracy (@25±10℃): ±0.05% FS; 8) Current measurement accuracy (@25±10℃): ±0.05% FS; 9) Output method: Four-wire output.
2	Constant Current Module	5V300A	1) Current output measurement range: -20~20A, -300~300A; 2) Current resolution: 0.01A; 3) Current output accuracy (@25±10℃): ±0.05% FS; 4) Current measurement accuracy (@25±10℃): ±0.05% FS; 5) Operating limit: ≦150A without output limit; ≧150A limit time 30s.
3	Charge-Discharge System	120V0.5A	1) Voltage output measurement range: 120V; 2) Voltage output accuracy (@25±10℃): ±0.05% FS; 3) Voltage measurement accuracy (@25±10℃): ±0.05% FS; 4) Current output measurement range: 500mA; 5) Current output accuracy (@25±10℃): ±0.1% FS; 6) Current measurement accuracy (@25±10℃): ±0.1% FS.
4	Temperature Simulation and Detection Unit (Programmable Resistance Module)	10Ω~12MΩ	1) Resistance output range: 10Ω~12MΩ; 2) Minimum step size: 1Ω; 3) Resistance accuracy (@25±10℃): ±0.15%; 4) Independent output per channel.
5	Signal Detection Unit	/	1) Voltage measurement range: 100mV, 6V, 50V, 150V; 2) Voltage measurement accuracy (@25±10℃): ±0.05%; 3) Resistance measurement range: 1Ω~1MΩ; 4) Resistance measurement accuracy (@25±10℃): ±1% ±1Ω; 5) Relay dry contact output 1: 30V 1A, 9

			normally open channels; 6) Relay dry contact output 2: 200V 1A, 3 normally open channels; 7) Input detection: 4 channels; 8) Power output: 3.3V 50mA, 5V 500mA, 12V 1A, total of 3 channels.;
6	CAN Communication Unit	USBCAN-2E-U	1) Supports standard and extended frames; 2) Supports CAN2.0A and CAN2.0B protocols; 3) Baud rate range: 40Kbps~1Mbps

4.3 Computer Configuration List

No.	Main Component Name	Model Specifications (Description)	Brand	Quantity
1	Computer	CPU i5, 16GB RAM, 250GB SSD, 500GB HDD, Dual LAN ports	/	1Set
2	Monitor	Computer Monitor	/	1Set
3	Mouse	/	/	1Set
4	Keyboard	/	/	1Set

4.4 Scope of Supply

No.	Item Description	Supplied by Customer	Supplied by Test Equipment Provider
1	Protection board collection wires, output wires, special connectors	V	
2	Test fixtures and tooling	V	
3	Test equipment and test cabinet (including cabinet internal circuits)		V
4	Test computer (including mouse/keyboard/monitor, etc.)		V
5	Test software		V
6	MES connection for test equipment		V

Note: The boundary for the scope of supply is outlined in the table above. During acceptance, the boundary will be based on the scope of supply provided by the test equipment provider for individual inspection.

5. Main Features

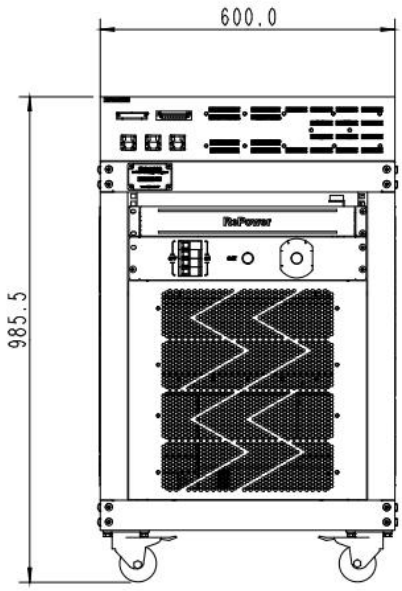
- The simulated battery adopts a design that integrates source and load, supporting both charging and discharging.
- The system provides multi-range, multi-level, high-precision outputs, suitable for product calibration and accuracy comparison testing.
- Supports secondary development, allowing users to customize testing projects.
- Can interact with PLCs for signal exchange, such as start, stop, abnormal, or completion signals.
- Supports multiple communication protocols, including I2C, SMBUS, UART, One-Wire, RS232, RS485, and CAN.
- Uses LAN communication, providing fast and stable long-distance communication.
- Modular design allows for future upgrades and easy maintenance.

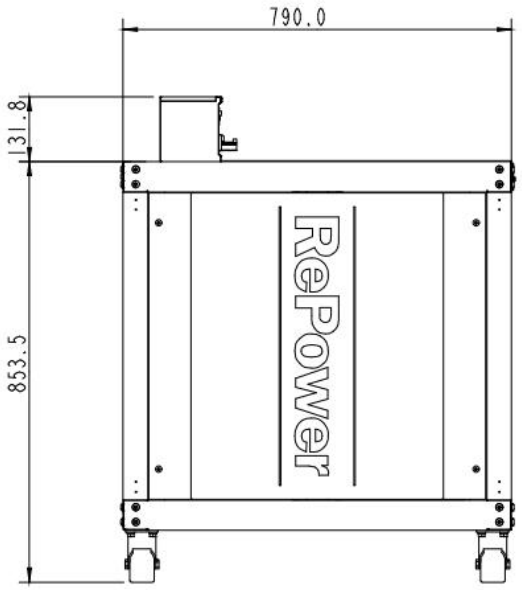
6. Overall Appearance and Dimensions

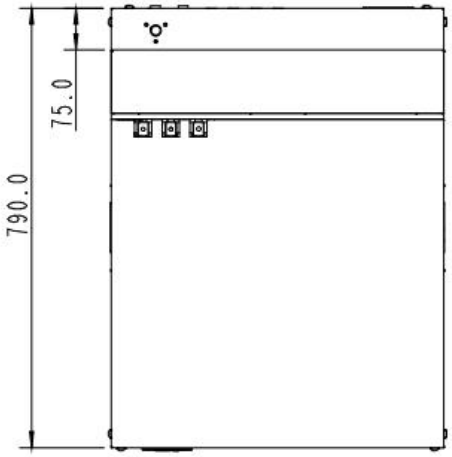
6.1 Equipment Appearance

Note: The appearance may vary depending on the specific functionalities delivered.

6.2 Equipment Dimensions (Unit: mm)

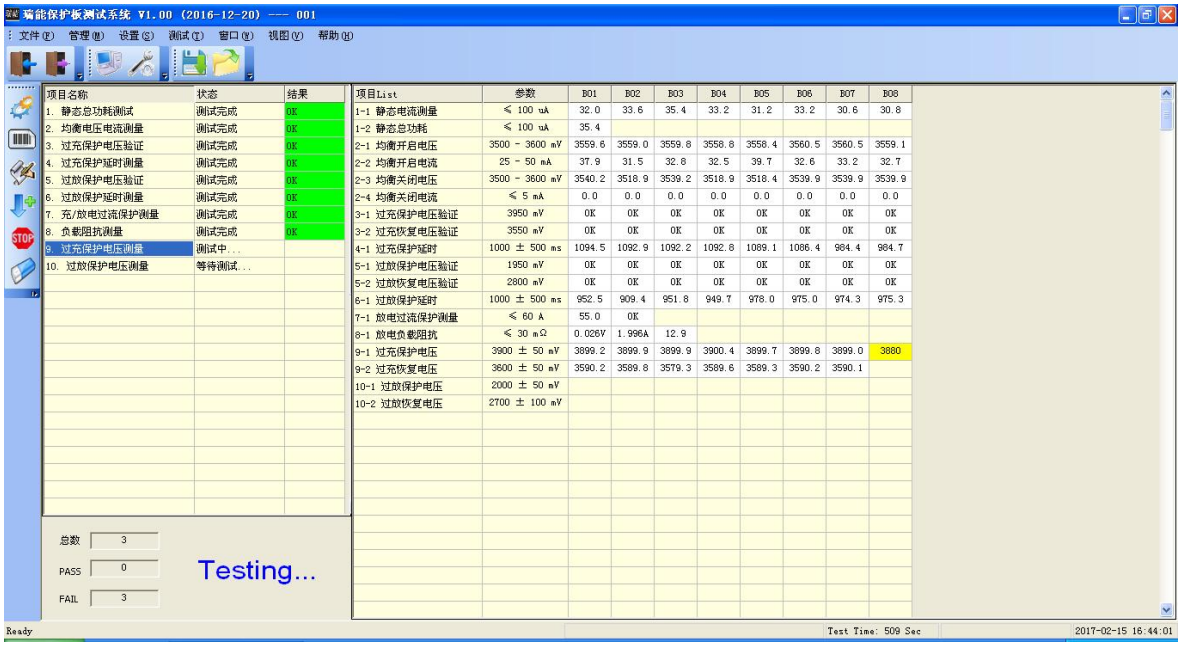






备注： 不同功能设备，外观不相同，以实际交付为准

7. Test Software Interface



8. Basic Parameters

No.	Item	Technical Parameter
1	Equipment Size	≤600*800*1030mm（W*D*H）
2	Equipment Weight	≤250KG
3	Number of Channels	1CH
4	Operation Mode	Manual wiring, automatic testing
5	Communication Mode	LAN/RS232
6	Input Power	AC220V±10%，50HZ±5%
7	Input Power Consumption	≤4KW
8	Dustproof and Cooling	Equipped with dustproof and cooling devices.
9	Cooling Method	Air-cooled
10	Operating Temperature	0℃～45℃
11	Storage Temperature	-10℃～70℃
12	Operating Relative Humidity	30%～85%(non-condensing).
13	Operating Environment Requirements	• The environment should be free from strong vibrations, corrosive gases, metal powders, dust, flammable, or explosive gases. • The equipment should maintain a proper distance from walls or other objects to ensure adequate ventilation and heat dissipation.
