

# Module EOL Test Equipment Technical Specification

Version:  
V1.0-20250224

**Model: RP-EOL-ULM03**

Party A: \_\_\_\_\_

Representative (seal):

Party B: \_\_\_\_\_

Representative (seal):

Contract Number: \_\_\_\_\_

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# 1、 Introduction

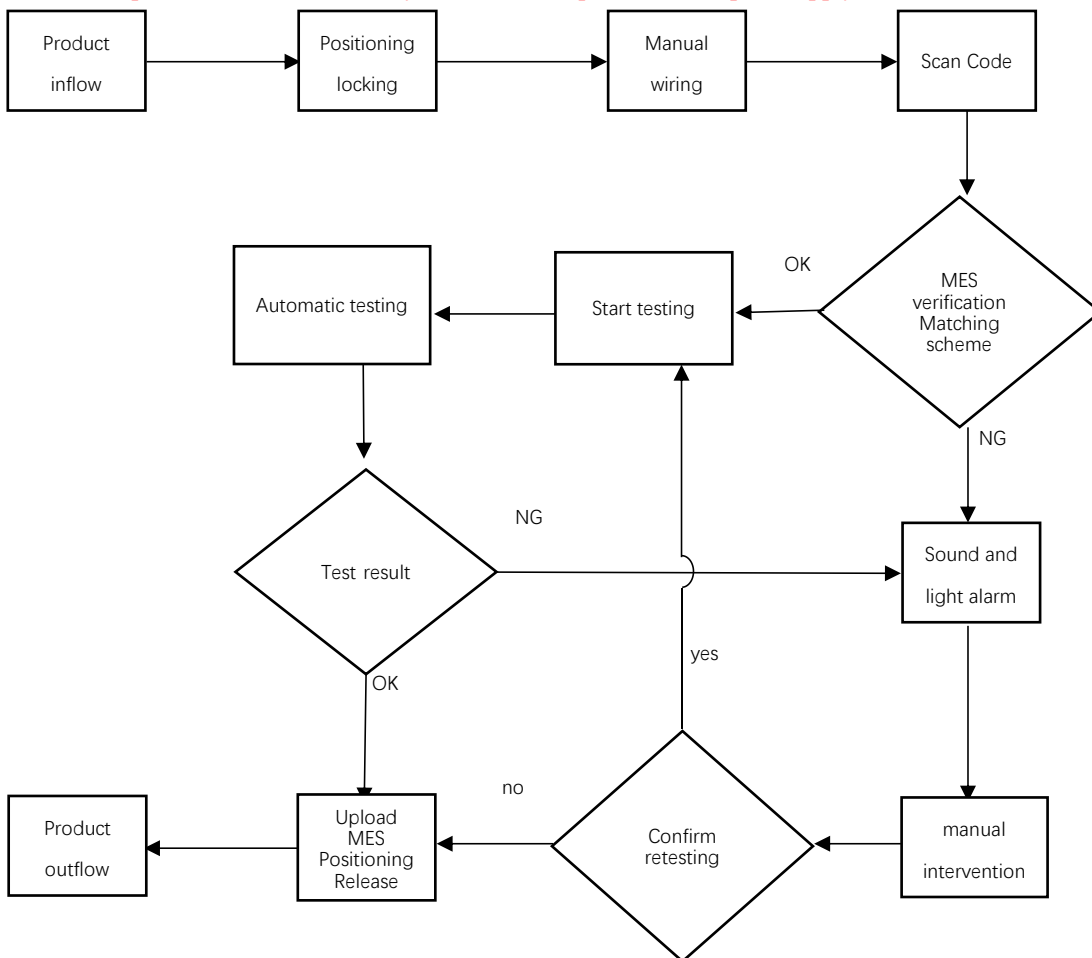
## 1.1 System Overview

The EOL testing system is mainly used for offline testing and quality control of battery modules or packs for electric vehicles, buses, container energy storage, household energy storage, and mobile energy storage. A comprehensive and intelligent testing platform developed to integrate automatic testing, data recording integration analysis, production efficiency, and other aspects of lithium battery offline, providing a complete static testing solution for power battery modules or PACK; The unique features include safe, fast, and efficient, customized test data output format, linkage testing with charging and discharging testing equipment, seamless integration with factory MES, and simple software operation interface.

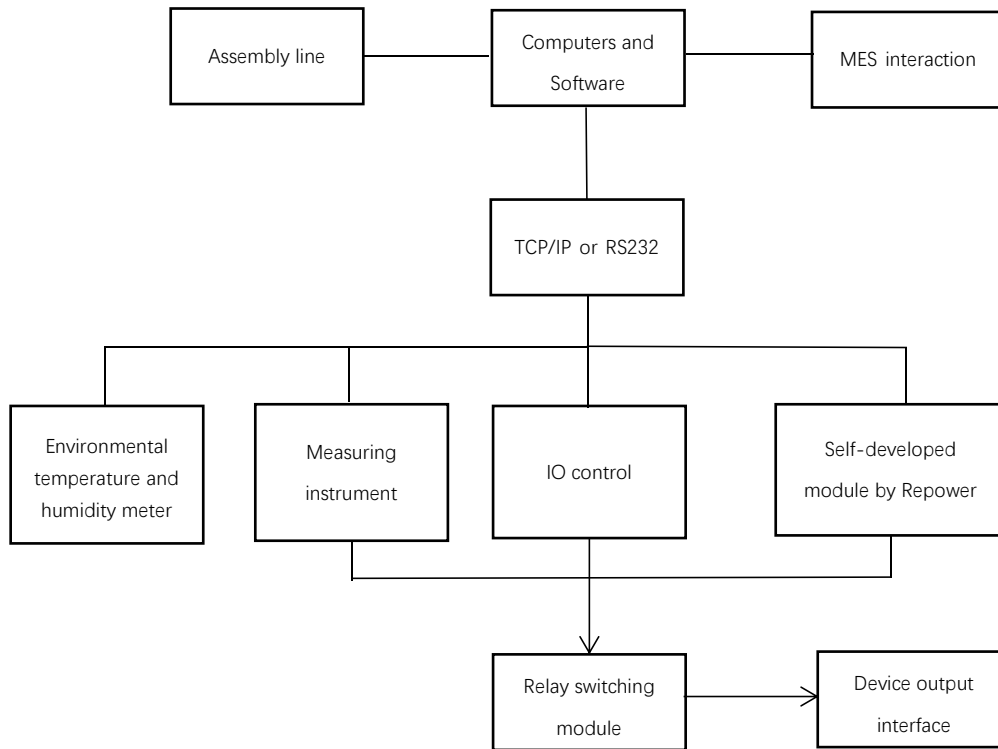
The models described in this technical specification document are primarily targeted at overseas markets. The equipment is designed in compliance with UL certification standards and has undergone testing and certification by professional institutions. It is engineered to provide global users with high-quality battery testing systems that meet international standards.

## 1.2 Basic testing process

**Note: The action process is for reference only and does not represent the scope of supply.**



**1.3 Equipment topology diagram**



**二、 Main components of the equipment**

**2.1 Main Equipment Configuration**

Number	Unit Name	Brand	Specification/Model	Number	Unit
1	Multimeter	Keysight	34461A	1	Pcs
2	Insulation Withstand Voltage Tester	Ainuo	BTS7436H	1	Pcs
3	ACR Tester	HIOKI	BT3563	1	Pcs
4	BMS Power Supply	Customized	Supplier-defined compatible models	1	Pcs
5	CAN Card	Customized	Supplier-defined compatible models	1	Pcs
6	Computer	Advantech	CPU17	1	Pcs
7	Monitor	Dell	21.5 inch	1	Pcs
8	Temperature & Humidity Meter	Renke	RJ45 Ethernet Port Recorder	1	Pcs
9	Barcode Scanner	Honeywell	1902GSR	1	Pcs

10	High Voltage Measurement Unit	RePower	RP-HV-Relays	1	Pcs
11	BMS Power & CAN Switching Board	RePower	RP-EOL-COMMUnit	1	Pcs
12	Single Cell Voltage Acquisition Board	RePower	RP-MOD-VRelay	1	Pcs
13	Total Voltage & NTC Acquisition Board	RePower	RP-MOD-TRelay	1	Pcs
14	IO Module	RePower	RP-EIO-128CH	1	Pcs
15	Control Software	RePower	RP-EOL-S/W	1	Pcs
16	Cabinet	RePower	EOL Cabinet	1	Pcs
17	Equipment Harness	RePower	EOL-MOD-SBX	1	Pcs
18	Test Harness	RePower	EOL-MOD-CSX	1	Pcs
19	Wire-cable hut	RePower	EOL-MOD-ZJH	1	Pcs
20	Master Resistor Box	RePower	RP-Master-01	1	Pcs

**Note: If Party A has requirements for the appearance and color of the equipment, Party A must provide a standard color card sample or color card number (except for electroplated parts and stainless steel). If there is no color requirement, the default color provided by Party B shall be followed.**

## 2.2 Special Material List

Number	Unit Name	Brand	Specification/Model	quantity	unit
1	Connector	\	Blue battery docking connector	2	set
2	Battery Module	\	Blueprint battery module (used during debugging)	1	set

**Note: As the special materials are bound to the product to be tested, Party A or the final user of the equipment should purchase them themselves, and Party B is responsible for wiring.**

**2.3 Scope of Supply Description**

Number	Item	Line integration party or demand party	Testing equipment party
1	Online Equipment Frame	V	
2	Docking Fixture (High/Low Voltage Plugs)	V	
3	Needle Bed Fixing Mechanism & Mobile Servo	V	
4	Probe	V	
5	RFID & Automatic Scanning	V	
6	Safety Light Curtain	V	
7	Test Instruments		V
8	Industrial Control Computer (Mouse/Keyboard/Monitor)		V
9	Test Software		V
10	Test Equipment MES Integration		V

**Note: The boundary of the equipment supply scope is shown in the table above. During acceptance, the supply scope of the testing equipment shall be used as the boundary point for separate acceptance.**

**2.4 Explanation of the responsible party**

Number	project	Line integration party or demand party	Testing equipment party
1	Connector skewed and misaligned, poor docking, and product scratches	V	
2	Mechanism malfunction, servo positioning	V	
3	Insufficient instrument accuracy, circuit failure in test cabinet		V
4	Test results uploaded, testing machine MES interaction		V

### 3、 Applicable product specifications

#### 3.1 Compatible product specifications

Number	Product Name	Nominal voltage	Number of Cells	Number of NTCs	Communication Protocol
1	Model A Prototype	300V	36	12	CAN/CANFD
2	Model B Prototype	300V	36	12	CAN/CANFD

**Note: The product models that need to be installed and adjusted on site are listed in the table above. If the equipment has met the acceptance conditions, Party A or the final user of the equipment is still unable to provide the blue products in the table above to Party B for debugging work, the acceptance conditions required by the business shall prevail.**

### 4、 Technical parameters

#### 4.1 Basic Equipment Parameters

序号	Item	Technical parameter
1	Equipment size	≤850*800*1980mm (W*D*H)
2	Number of device channels	1 channel
3	Operation mode	Manual wiring, automatic testing
4	Internal communication	LAN/RS232
5	Product communication	CAN/CANFD(based on configuration list)
6	Input voltage	AC220V±10%, 50/60Hz or AC110V±10%, 50/60Hz
7	Input power	≤2kW
8	Protection rating	IP32
9	Cooling method	Air-cooled
10	Security level	Complies with EN60950 and GB4943 requirements
12	Equipment working environment temperature	0°C~45°C
13	Device storage temperature	-10°C~70°C
14	Maximum relative humidity during equipment operation	30%~70% (RH non condensing)

**4.2 Equipment functional parameters**

Number	Unit Name	Brand	Model	Specification parameters
1	Multimeter	KEYSIGHT	34461A	1) Resolution: 6½ 2) Voltage Range: 1000VDC 3) Resistance Range: 100MΩ
2	Insulation Withstand Voltage Tester	Ainuo	BTS7436H	1) AC Withstand Voltage (ACW): 5kV/100mA 2) DC Withstand Voltage (DCW): 6kV/20mA 3) Insulation Resistance (IR): 6kV/50GΩ
3	ACR Tester	HIOKI	BT3563	1) Voltage Range: 300VDC 2) Resistance Range: 3000Ω
4	CAN	Customized	Supplier-defined compatible models	1) Supports Standard Frame and Extended Frame 2) CANFD, CAN2.0A, and CAN2.0B Protocols 3) Baud Rate: 40Kbps~5Mbps
5	BMS Power & CAN Switching Board	RePower	RP-EOL-COMM Unit	1) BMS power supply switching, activation/ignition enable signal output 2) CAN termination resistance measurement, CAN-to-ground voltage measurement (requires additional instruments)
6	Single Cell Voltage Acquisition Board	RePower	RP-MOD-VRelay	1) 36-cell battery module measurement (requires additional instruments), expandable as needed; 2) Internally series-wired measurement circuits with short-circuit and overload protection

7	Total Voltage & NTC Acquisition Board	RePower	RP-MOD-TRelay	<ol style="list-style-type: none"> <li>1) 12-channel NTC resistance measurement (requires additional instruments), expandable as needed;</li> <li>2) 4-channel voltage measurement with short-circuit and overload protection</li> </ol>
8	IO Module	RePower	RP-EIO-128CH	<ol style="list-style-type: none"> <li>1) Digital Output Module with High Voltage Isolation Technology (Anti-Breakdown)</li> <li>2) High-Speed MCU Chip for Rapid Response</li> <li>3) TCP/IP Communication Protocol for Secure &amp; Stable Connectivity</li> </ol>
9	Control Software	RePower	RP-EOL-S/W	<ol style="list-style-type: none"> <li>1) RePower EOL Testing Software</li> <li>2) Supports Local Data Export, MES Data Upload Service, etc.</li> <li>3) Supports Rapid Recipe Switching for Different Products Under Test</li> <li>4) Two test product debugging services are provided by default</li> </ol>
10	Master Resistor Box	RePower	RP-Master-01	<ol style="list-style-type: none"> <li>1) Insulation Resistance: 50M<math>\Omega</math>, 200M<math>\Omega</math>, 700M<math>\Omega</math></li> <li>2) DC Withstand Resistance: 1M<math>\Omega</math>, 4M<math>\Omega</math></li> <li>3) AC Withstand Resistance: 500k<math>\Omega</math>, 1M<math>\Omega</math></li> <li>4) External, Manual Wiring, Automatic Inspection by Host Software</li> </ol>

**4.3 System testing items**

<b>Number</b>	<b>Test items</b>	<b>Function Description</b>	<b>Testing instruments</b>
1	Fixture fixed-point	Test fixture to battery module fixed point	Manual
2	Single Cell Voltage Test (FPC Interface)	According to the predefined test plan, measure module cell voltage and calculate voltage difference via relay-switched multimeter. FPC connectors are used for sampling line detection.	Multimeter
3	Single Cell Temperature Test (FPC Interface)	According to the predefined test plan, measure module cell temperature and calculate temperature difference via relay-switched multimeter. FPC connectors are used for sampling line detection.	Multimeter
4	Total Module Voltage Test	According to the predefined test plan, measure open-circuit voltage between positive and negative terminals via relay-switched multimeter.	Multimeter
5	Manual Harness Removal	Manually remove low-voltage interface (FPC interface) harness, then click 'Continue Test' on the host computer.	Manual
6	Total Positive/Negative to Casing Insulation Test	According to the predefined test plan, connect module's total positive/negative terminals to the withstand voltage tester's positive pole and module casing to the negative pole via relay switching.	Insulation Withstand Voltage Tester
7	Total Positive/Negative to Casing Withstand Voltage Test	According to the predefined test plan, connect module's total positive/negative terminals to the withstand voltage tester's positive pole and module casing to the negative pole via relay switching.	Insulation Withstand Voltage Tester
8	Test data upload	Upload test data to the MES system.	\

**Note: The EOL testing system is a customized equipment, and the equipment configuration and function shall be based on meeting the testing items specified in the table above. Any additional items shall be evaluated and confirmed by Party B. Additional items shall not be used as acceptance criteria for this agreement.**

## 4.4 Standard functional requirements

### 4.4.1 General Hardware Functions

- 1) The equipment is equipped with insurance and an external AC switch, which has anti leakage and human protection functions;
- 2) The equipment is equipped with a bus emergency stop switch and hardware emergency stop function;
- 3) All high and low voltage relays in the equipment configuration are set to normally open by default to prevent unexpected situations;
- 4) The wiring harness of the device connected to the positive and negative terminals of the battery, as well as the box, is equipped with fuses to prevent accidental situations;
- 5) Module/Pack safety, voltage, temperature, faults, and other abnormalities, equipment stops testing and sound and light alarms;
- 6) The temperature of the module/pack testing environment is extremely abnormal, and the equipment stops testing with an audible and visual alarm;

### 4.4.2 General software functions

- 1) Provide four modes: automatic, manual, debugging, and automatic idle operation (without the need for materials and equipment to operate in a safe state). Switching between operating modes requires different permissions;
- 2) Provide reasonable production control strategies and propose reasonable handling measures for various situations that can be encountered in production;
- 3) Provide comprehensive fault diagnosis functions. When equipment testing malfunctions, the control panel can indicate the type and location of the fault, and provide specific handling methods if necessary;
- 4) Collect and display production information, such as current output, planned output, process optimization rate, etc;
- 5) Can accurately identify and distinguish the barcodes of modules, and save their respective data according to the barcodes;

#### 4.4.3 Product Highlights

- 1) The testing system complies with **UL** certification standards, which cover the equipment import requirements of most regions worldwide.
- 2) The equipment adopts a modular design for its functions. Users can select and configure corresponding test modules based on actual usage scenarios, different products, and testing requirements—i.e., defining the equipment’s functions according to product needs.
- 3) The equipment is compatible with instruments and key electronic components from multiple brands and models. Core components meet CE and UL certification requirements and are fully replaceable with equivalent performance. Meanwhile, test interfaces are reserved for most instrument functions to facilitate secondary development of the instruments.
- 4) The entire machine meets the IP32 protection rating, enabling it to adapt to various complex usage environments.
- 5) With a small footprint, the built-in rollers and leveling feet design allows for easy movement and positioning of the equipment.

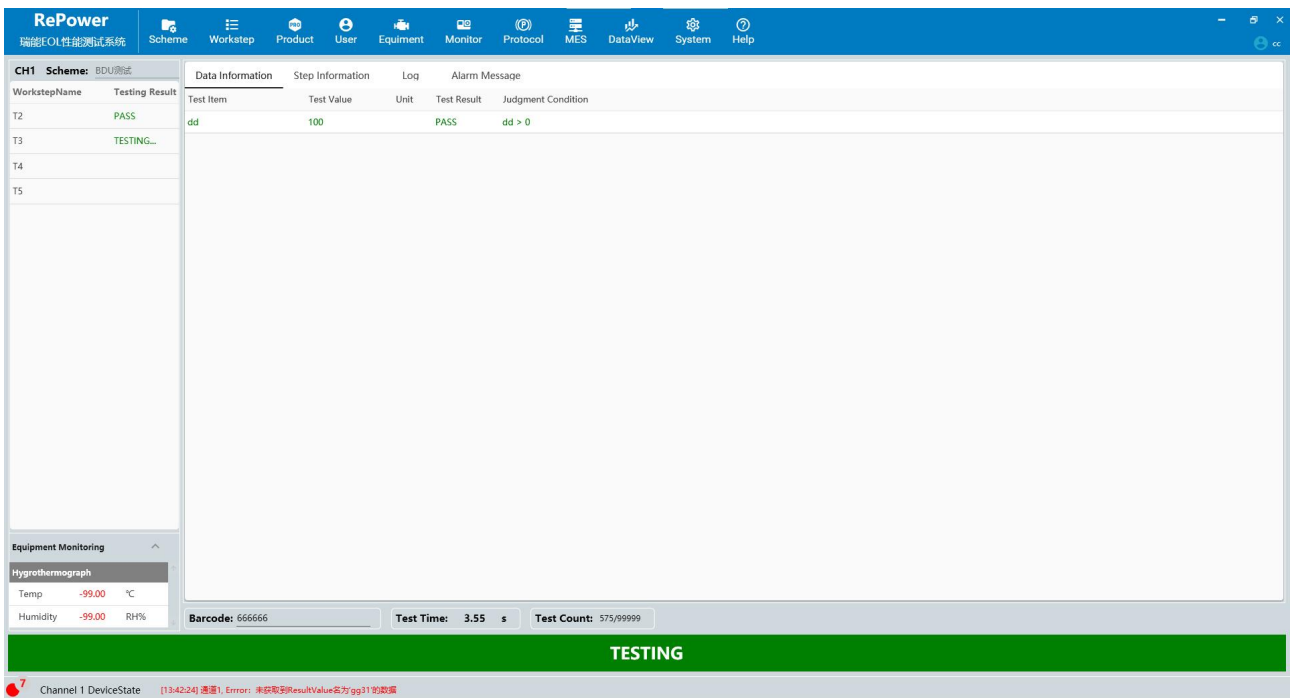
## 5、 System diagram

### 5.1 Equipment appearance rendering



(Subject to the physical product)

### 5.2 Software interface



## **6、 Equipment pre acceptance and final acceptance standards**

If Party B completes the debugging and trial operation for 30 days without any abnormal problems, it can enter the acceptance process and execute according to the relevant provisions of the technical agreement.

The acceptance shall be carried out by designated engineering and technical personnel from both parties, who shall jointly sign the acceptance report.

Acceptance mainly involves the acceptance of various functions, technical indicators, and appearance of the equipment.

If due to the reasons of Party A, if Party A does not have the production conditions, does not have corresponding products for Party B to debug, or is unable to provide installation and debugging conditions, Party A still does not notify installation within 30 days from the date of equipment delivery, or does not notify debugging within 30 days from the date of installation completion, it shall be deemed that the product acceptance is qualified.

## **7、 Installation, debugging, and training**

Unless otherwise requested in writing, Party A shall be responsible for receiving; And prepare relevant electricity, gas, and other equipment input terminals.

The second party is responsible for delivering the goods to the location designated by the first party, the first party assists in transporting the machines to the installation site, and the second party carries out the installation and debugging of the equipment.

The first party shall provide the second party with raw materials that can meet the requirements for debugging the machine, including the prototype battery to be tested, BMS communication protocol, DBC files, UDS unlocking algorithm, testing process requirements documents, etc.

After installation, both parties shall conduct small-scale trial production of their equipment. Only after the small-scale trial production is qualified and approved by Party B can it be put into formal mass production.

The second party shall provide free training to the relevant personnel of the first party, including the normal use, maintenance, fault analysis and troubleshooting, operation safety, and emergency handling procedures of the equipment. The first party must arrange for technical

leaders, engineers, operators and other personnel who may use the equipment to be present and cooperate with the training, and sign and confirm on the "Equipment Training Attendance Form" provided by the second party.

## **8、 Quality assurance and after-sales service**

The warranty period for the equipment is one year, during which Party B is responsible for free maintenance and repair of the equipment (excluding vulnerable parts). The second party guarantees to respond by phone within 2 hours and submit a solution within 4 hours after receiving the equipment failure notice from the demand side; If necessary, rush to the buyer's site for maintenance within 48 hours.

After the warranty period expires, Party B shall still be responsible for repairing and maintaining the equipment, but shall only charge reasonable working hours and related travel expenses. For the replacement and purchase of equipment related accessories, Party B shall only charge the cost of accessories.

The second party will provide timely after-sales service by providing 24-hour technical support personnel on duty telephone.

## **9、 Confidentiality clause**

The first party shall strictly keep confidential any trade secrets of the seller that they become aware of as a result of the performance of this agreement, including but not limited to equipment technical parameters, configuration standards, equipment prices, product specifications, etc. Without the written consent of Party B, no information known during the cooperation shall be disclosed to any third party. If Party A violates the provisions of this agreement and leaks Party B's trade secrets, Party A shall compensate Party B for its direct losses. This clause shall remain valid for five years after the termination of this agreement.

## **10、 Other matters and agreements**

This agreement shall be authorized, signed and stamped by both Party A and Party B, and shall come into effect simultaneously with the signing of the business contract.

This agreement, as an appendix to the business contract, is made in duplicate, with Party A holding one copy and Party B holding one copy. Any matters not covered in this agreement shall be resolved through consultation between both parties.