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Table of Contents

1. Product Overview

The ET500 battery pack leak tester, developed by Smartsafe, is a high pressure battery pack leakage testing device primarily used to verify the seal quality of encapsulated batteries. It supports battery pack leakage testing of ternary lithium batteries, lithium iron phosphate batteries, lithium titanate batteries, and lithium manganate batteries. During the test, battery pack parameters such as volume, pressure, test duration at each stage, and leakage limit can be preset. This product primarily uses compressed air as a medium to apply a certain pressure to the battery pack cavity. A highly sensitive sensor detects changes in pressure to determine the sealing performance.

1.1 Product Features

- **High Sensitivity:** Highly sensitive pressure sensing significantly improves test accuracy and stability.
- **Large Display:** A 10-inch touchscreen display provides a clear overview of the test process and data.
- **Process Visualization:** The test progress and time are displayed at each stage.
- **Dual Pressure Display:** Features a real-time pressure gauge and a process pressure curve display.
- **Parameter Management:** Preset test parameters for standard parts and directly called, which is convenient and fast.
- **Parameter Settings:** Preset parameters such as workpiece number, volume, pressure, stage time, and leakage limit.

1.2 Main Function and Test Range

Mainly used for the leakage test of battery packs.

1.3 System Components

The tester consists of main unit, AC power cord and air pipes, etc.
The main unit includes display screen, data processing unit, data acquisition unit and panel operation unit.

1.4 Working Conditions

NO CORROSIVE, NO EXPLOSIVE, NO ELECTRICAL BREAKDOWN AIR OR CONDUCTIVE DUST.

2. Precautions for Safe Use

2.1 General Rule

Please follow the user manual to use this tester.

2.2 Common Incorrect Operation

1） Tools for connecting are not well insulated.
2） Operating without following the user manual.

2.3 Damage Probably Caused by Incorrect Operation

1） Short circuit accident: Tools is not well insulated, or battery pack positive and negative electrodes are too close.

2） Failure to follow the correct operation method will cause the device not working properly.

2.4 Emergency Treatment In Exceptional Cases

Disconnect the tester power supply and test cables.

2.5 Precautions in Exceptional Circumstances

If the operator uses tools without well insulation or improper operate to cause short circuit, please separate the cables immediately.

2.6 Other Safety Alerts

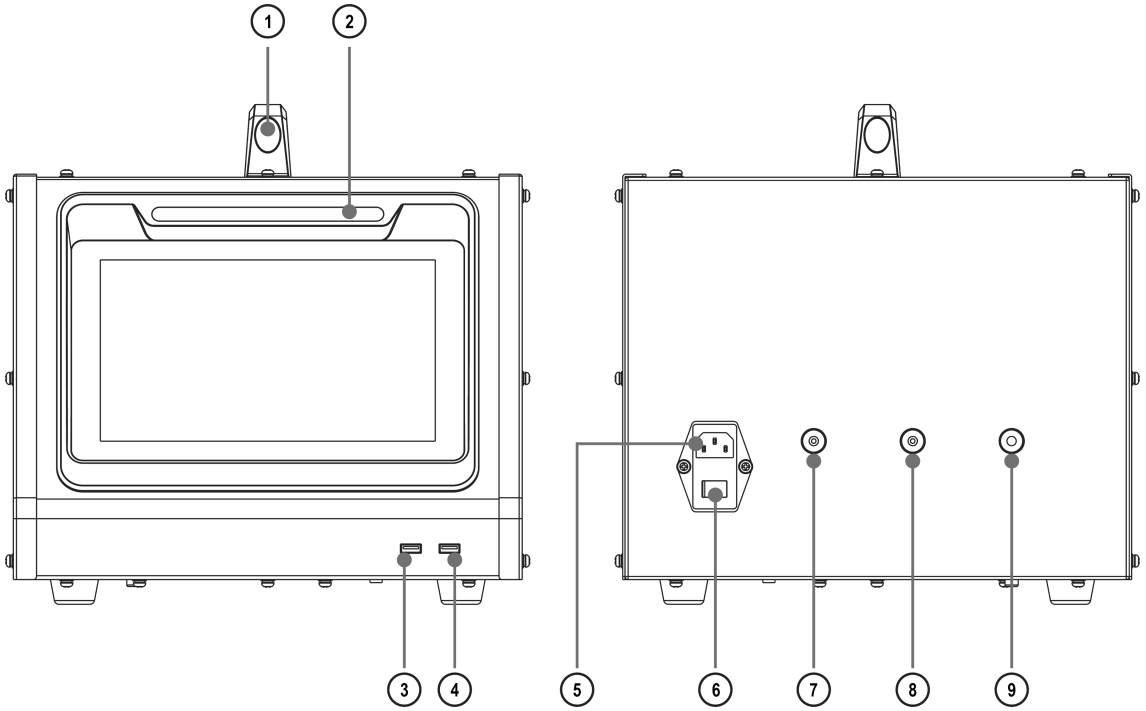
Strict compliance with safety operating norms and correct operating procedure.

3. Technical Features

Parameter	Description
Model	ET500
Test Method	Pressure
Test Pressure Range	Low pressure: 0 ~ 30kPa; High pressure: 31 ~ 500kPa
Sensor Resolution	1Pa
Sensor Accuracy	±5Pa
Display	10-inch LCD touch screen
Communication Port	USB
Data Storage	Internal memory/download via USB disk
Power Supply	AC 100~240V
Air Supply	0.1 ~ 1.0 Mpa dry compressed air
Air Inlet Port	φ6mm air pipe
Air Outlet Port	φ6mm air pipe
Work Temperature	-5°C ~ 45°C
Work Humidity	5% ~ 93%
Dimension	363.7 x 338.9 x 323.0mm

4. Operating Instructions

4.1 Panel Description

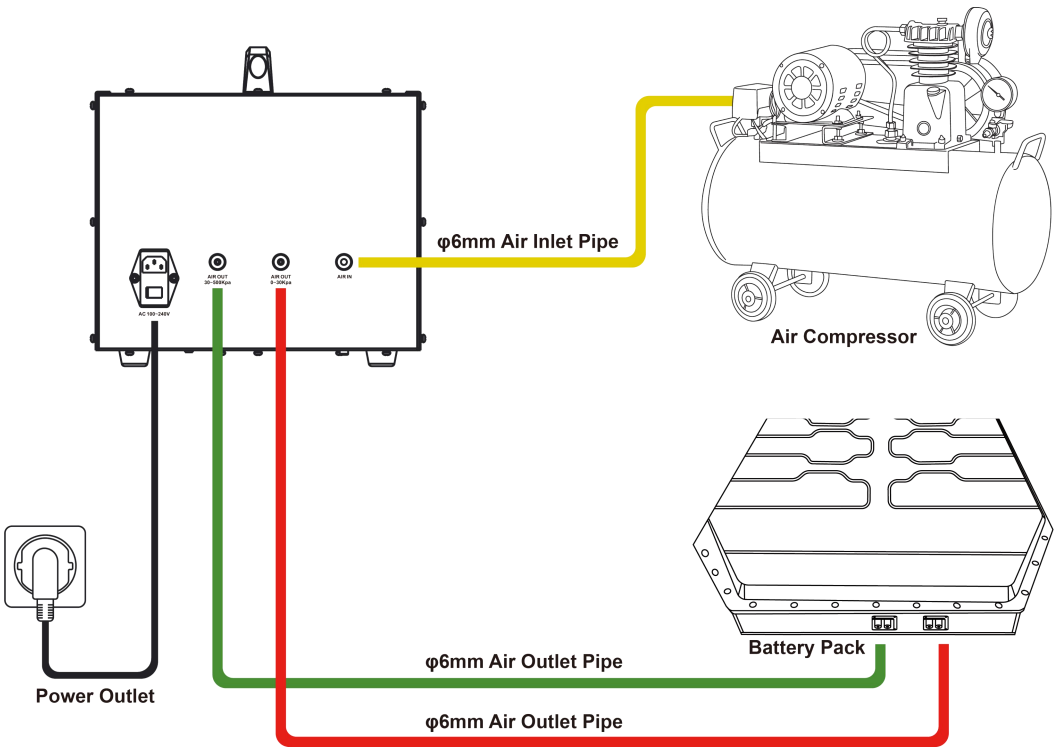


No.	Name	Description
1	Handle	For easy transport.
2	Indicator light	Green constant light indicates standby mode, Flashing green indicates work in progress, Flashing red indicates a fault/shutdown warning
3	USB 1	For copying data or inserting a USB network adapter
4	USB 2	For copying data or inserting a USB network adapter
5	Power Socket	100~240V power input.
6	Power Switch	Tester turn on/off.
7	High-pressure air output port	Connects to the battery pack, with a maximum pressure of 500kPa
8	Low-pressure air output port	Connects to the battery pack, with a maximum pressure of 30kPa
9	Air Inlet Port	Air supply inlet.

4.2 Tester Connection

- **Air supply connection:** Connect the 0.1~1.0 Mpa dry and clean air source to the air inlet port of the tester through the φ6mm air pipe.
- **Power Supply Connection:** Use the provided power cord to connect the tester to 100~240V AC power supply.
- **Low-Pressure Air Outlet Connection:** When the test pressure is ≤30 kPa, connect the test piece to the low-pressure air outlet (AIR OUT 0-30 kPa). Use a φ6 mm diameter air pipe to connect the test piece to the device. Ensure the connection is airtight.

- **High-Pressure Air Outlet Connection:** When the test pressure is greater than 30 kPa, connect the test piece to the high-pressure air outlet (AIR OUT 30-500 kPa). Use a φ6 mm diameter air pipe to connect the test piece to the device. Ensure the connection is airtight.



Connecting Diagram

4.3 Seal All Other Openings on the Test Piece

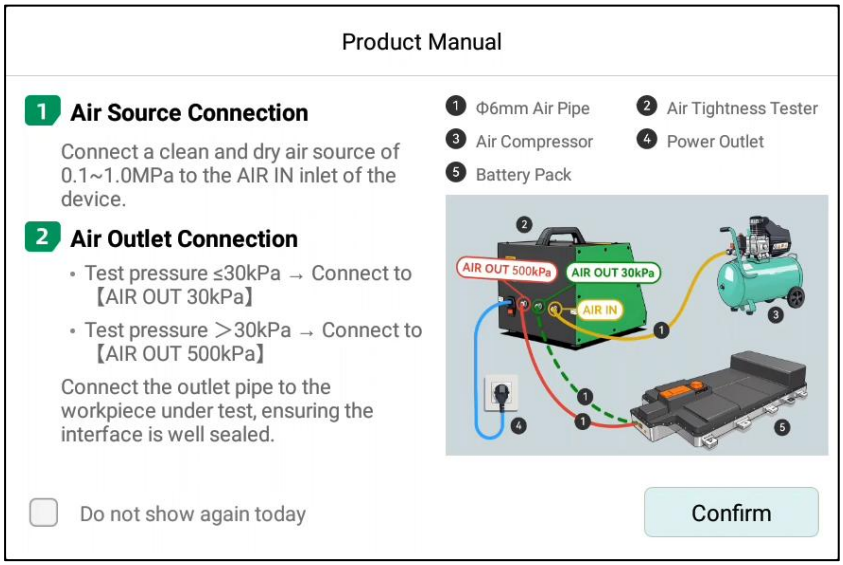
Seal all vents on the test piece, except the test port, to prevent leaks from interfering with test results.

4.4 Device Operation

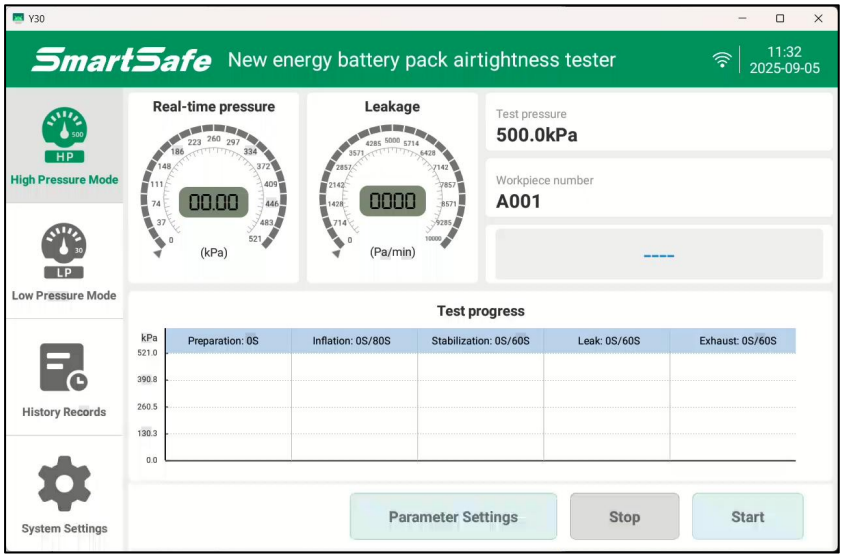
After completing the device connection, turn on the device power switch and turn on the device.

4.4.1 Main Menu of Functions

After the device is turned on, a pop-up window will prompt "Product Manual".

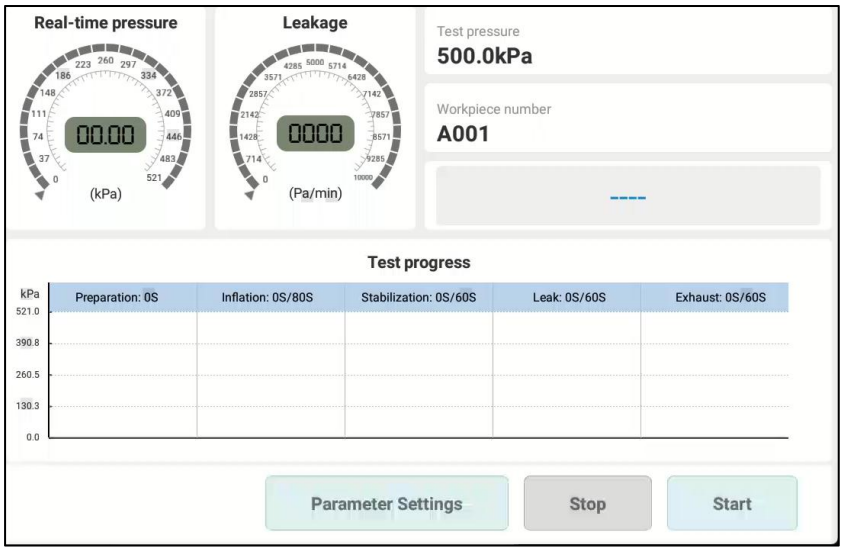


After carefully reading the relevant instructions, click **"Confirm"** to enter the main interface. Users can click on the function module icon on the left side of the screen to switch to different function module interfaces. The left functional module includes **High pressure mode**, **Low pressure mode**, **History records**, and **System settings**.

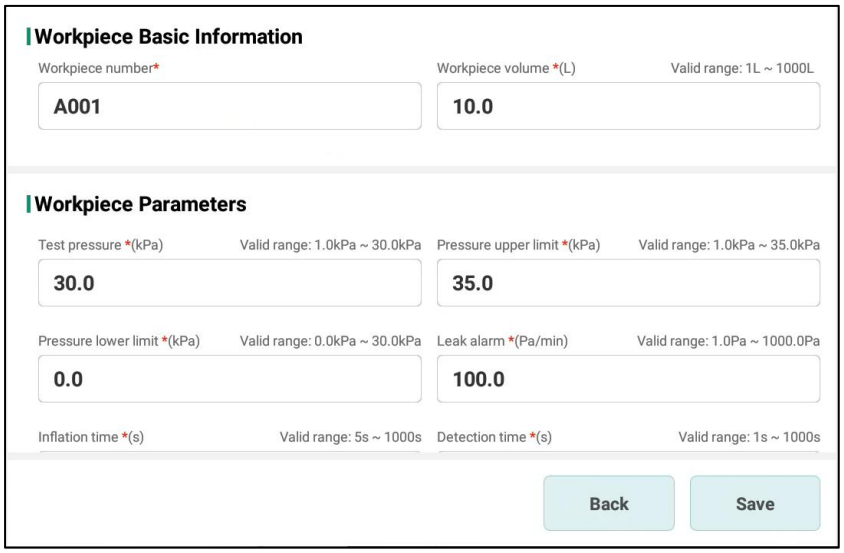


4.4.2 High Pressure Mode

On the main interface, click the **"High Pressure Mode"** function module on the left side of the screen to enter the high pressure detection interface.

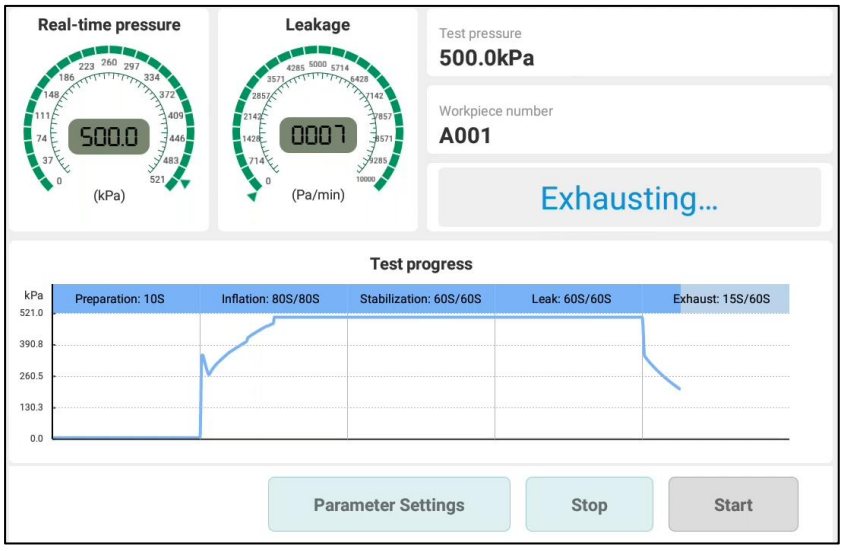


Click on **"Parameter Settings"** on the high pressure detection interface to preset high pressure detection parameters.



No.	Name	Description
1	Workpiece number	Target battery pack number, used to mark the tested workpiece.
2	Workpiece volume	Target battery pack volume, input according to the actual value.
3	Test pressure	Set the target pressure for inflation.
4	Pressure upper limit	The maximum allowable testing pressure for the tested workpiece.
5	Pressure lower limit	The minimum allowable testing pressure for the tested workpiece.
6	Leak alarm	If the leakage volume is less than or equal to the set alarm value, the system determines that the airtightness is qualified. If the leakage volume exceeds the set alarm value, the system determines that the airtightness is unqualified.
7	Inflation time	The inflation time can be set according to the battery pack size.
8	Detection time	The detection time that the tester starts to detect the change in the leakage value after the holding Time.
9	Stabilization time	A holding time that the tester will stop inflating and wait for pressure change.
10	Exhaust time	Time to exhaust gas after the test is complete.
11	Inflation speed	The speed at which the device inflates the battery pack includes two options: "fast" and "slow".

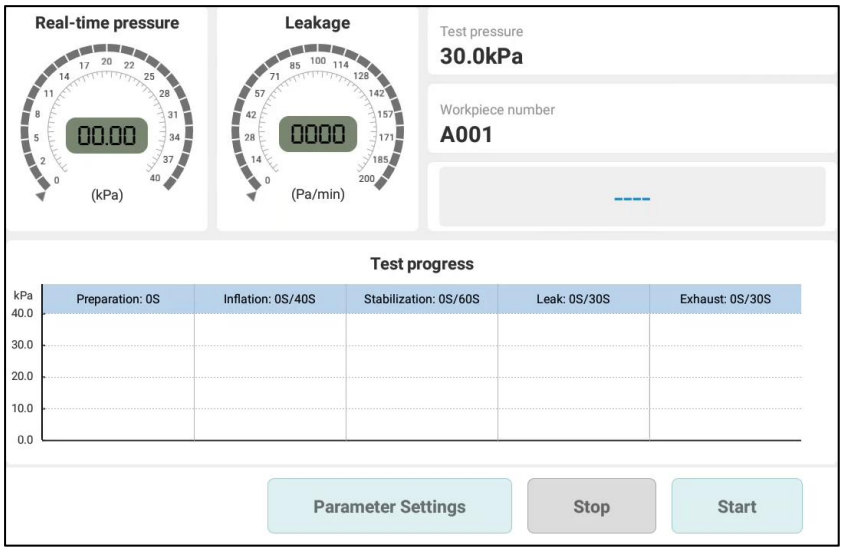
After setting the parameters, click **"Save"** to save the current settings and return to the high pressure detection interface. Click **"Start"** on the high-pressure detection interface to start the detection.



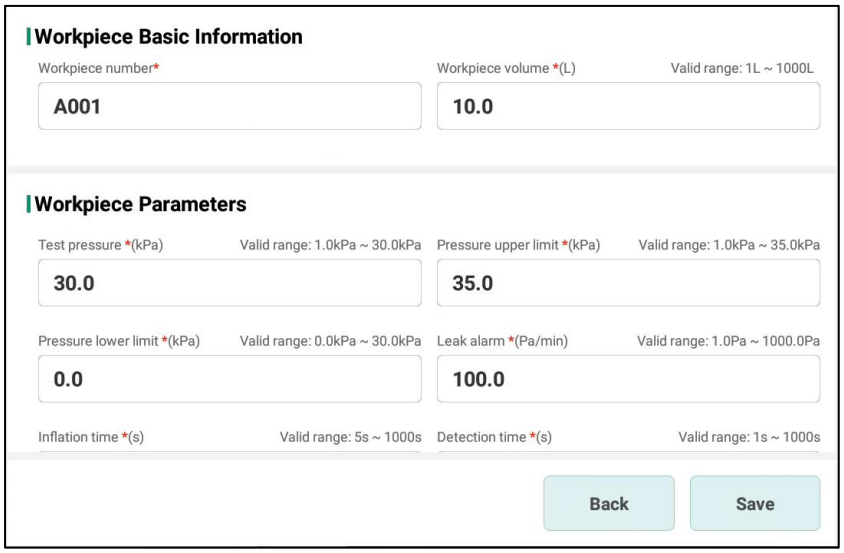
During the testing process, you can check the testing progress and wait for the testing results. Click **"Stop"** to end the current detection.

4.4.3 Low Pressure Mode

On the main interface, click the **"Low Pressure Mode"** function module on the left side of the screen to enter the low pressure detection interface.

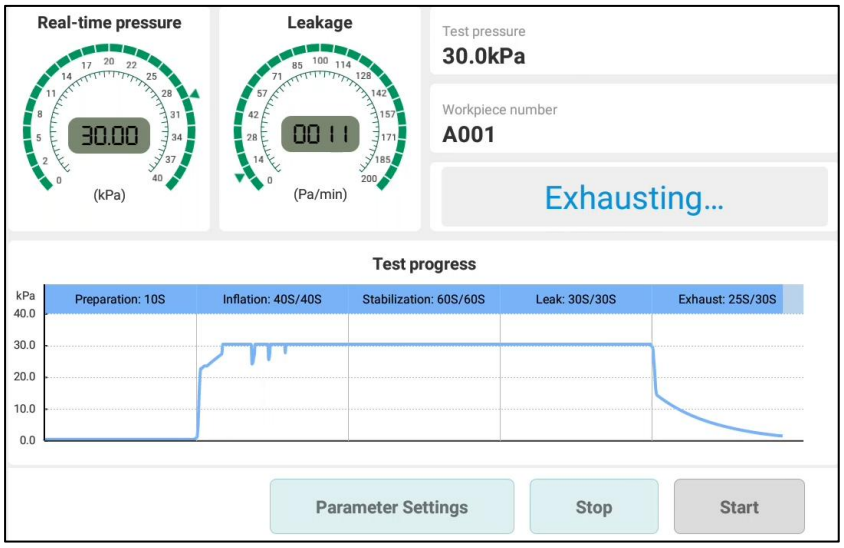


Click **"Parameter Settings"** on the low pressure detection interface to preset low pressure detection parameters.



No.	Name	Description
1	Workpiece Number	Target battery pack number, used to mark the tested workpiece.
2	Workpiece volume	Target battery pack volume, input according to the actual value.
3	Test Pressure	Set the target pressure for inflation.
4	Upper Pressure limit	The maximum allowable testing pressure for the tested workpiece.
5	Lower pressure limit	The minimum allowable testing pressure for the tested workpiece.
6	Leak Alarm	If the leakage volume is less than or equal to the set alarm value, the system determines that the airtightness is qualified. If the leakage volume exceeds the set alarm value, the system determines that the airtightness is unqualified.
7	Inflation Time	The inflation time can be set according to the battery pack size.
8	Detection Time	The detection time that the tester starts to detect the change in the leakage value after the holding Time.
9	Stabilization time	A holding time that the tester will stop inflating and wait for pressure change.
10	Exhaust Time	Time to exhaust gas after the test is complete.
11	Inflation speed	The speed at which the device inflates the battery pack includes two options: "fast" and "slow".

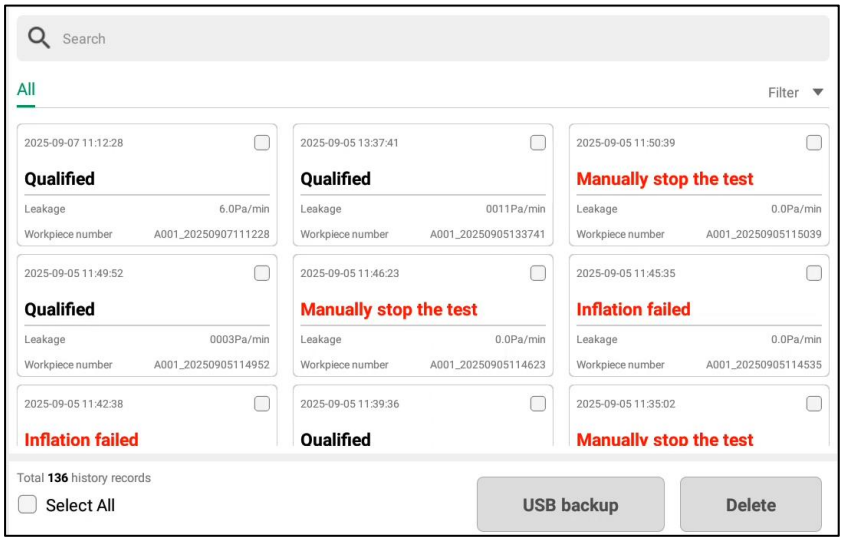
After setting the parameters, click **"Save"** to save the current settings and return to the low pressure detection interface. Click **"Start"** on the low pressure detection interface to start the detection.



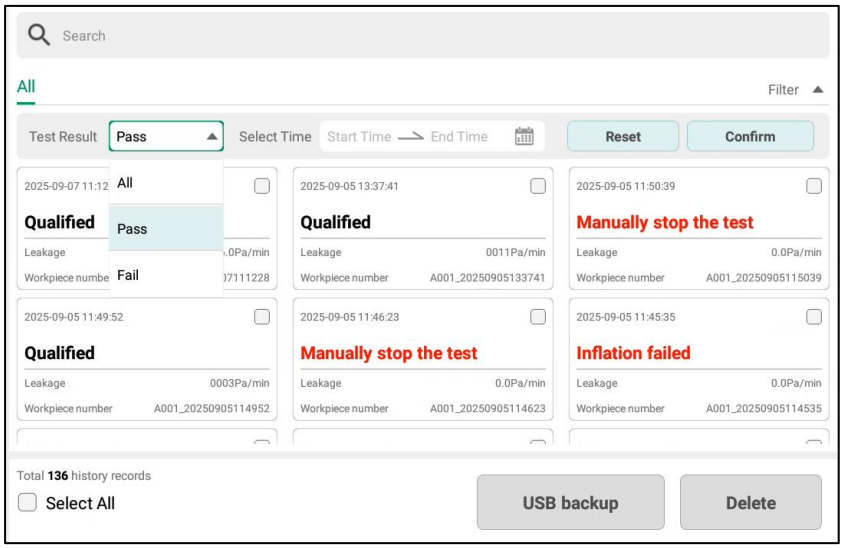
During the testing process, you can check the testing progress and wait for the testing results. Click **"Stop"** to end the current detection.

4.4.4 History Records

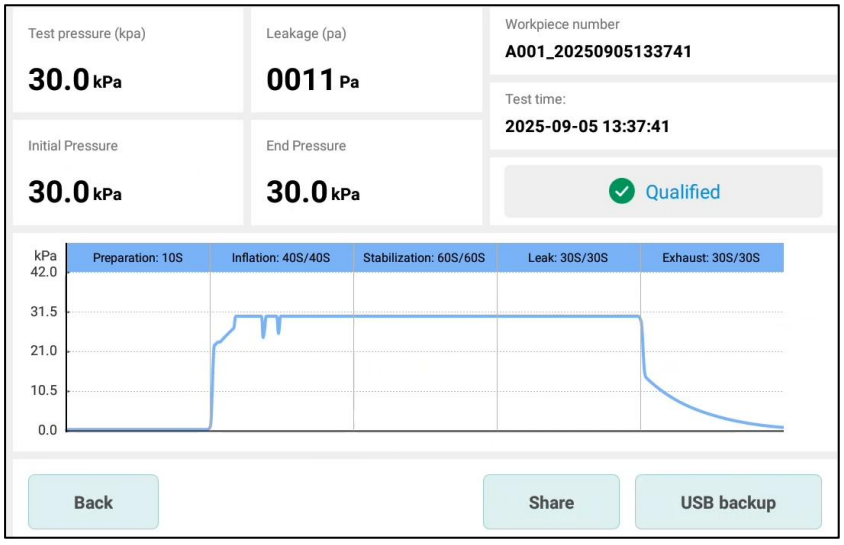
1) Click on **"History Records"** in the left function menu of the main interface to enter the history interface.



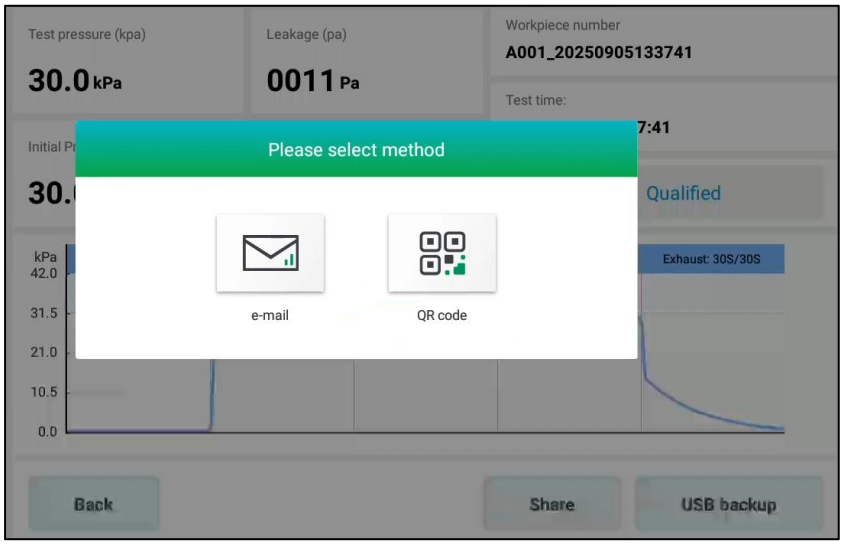
2) Select a single or multiple history records, and then click **"Delete"** to delete the selected records.
3) Select a single or multiple history records, insert the USB drive into the USB 1 port on the device panel, and then click **"USB backup"** to save the selected history records to the USB drive.
4) Click **"Filter"** to set criteria to filter out history records that meet the criteria.



5) Click on a single record to view its details.



6) Click **"Share"** to share the test records through **"QR code"** or "email.

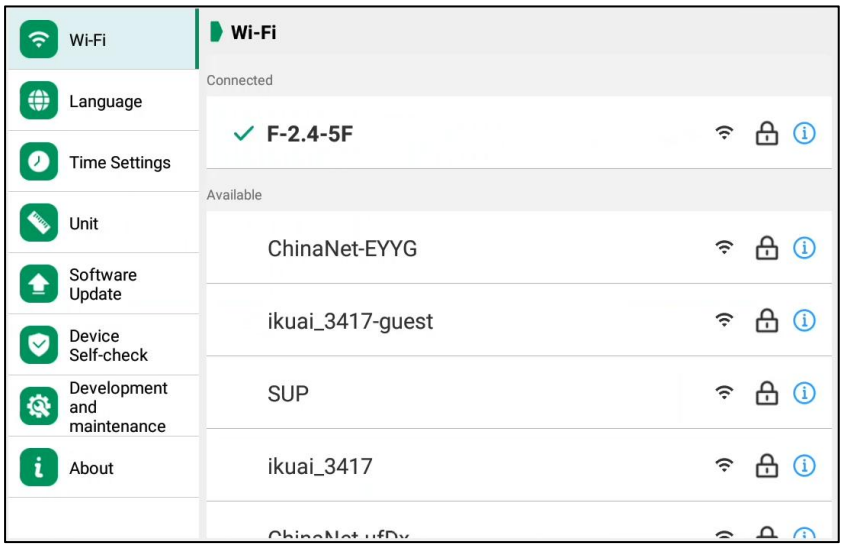


4.4.5 System Setting

Click on **"System Settings"** in the left function menu to enter the system settings interface. System settings include **Wi-Fi**, **Language**, **Time settings, Unit**, **Software update**, **Device self-check**, **Development and maintenance**, and **About**, etc.

4.4.5.1 Wi-Fi

Used to set up wireless network connections for devices.

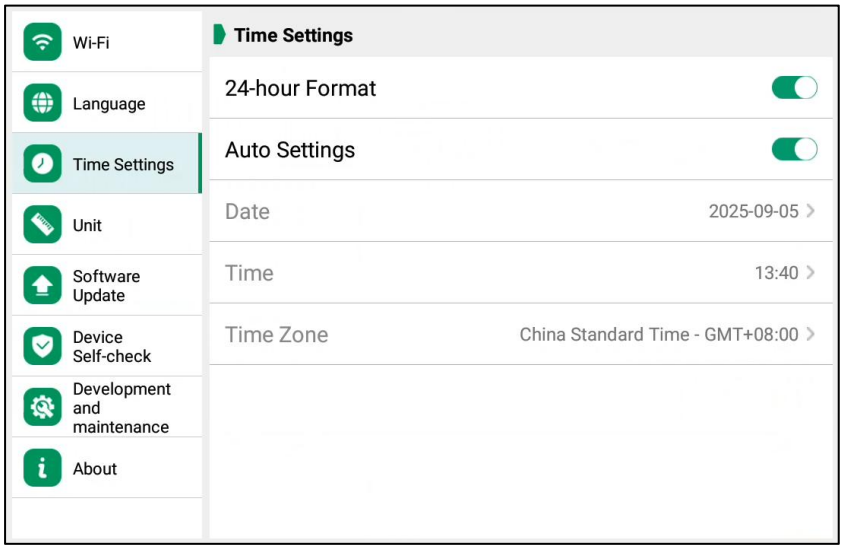


4.4.5.2 Language

Used to set the system language.

4.4.5.3 Time settings

Used to set dates, times, and time zones, etc.



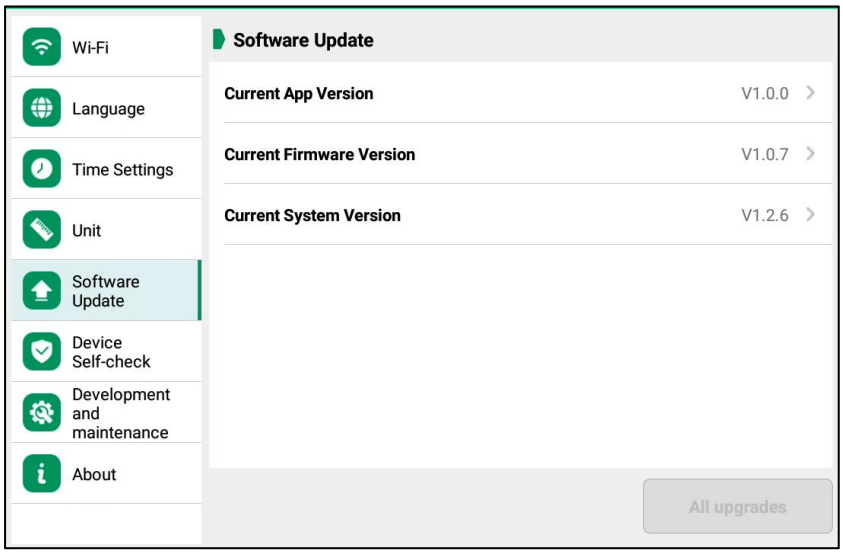
4.4.5.4 Unit

Used to set the display unit for leakage rate and real-time pressure.

4.4.5.5 Software Update

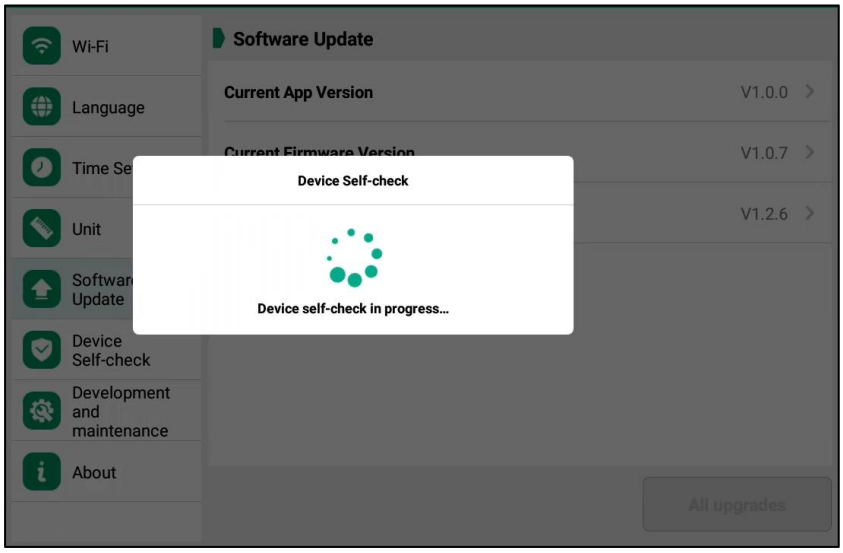
This function is used to view software version information and perform software updates on devices, including **APP updates**, **System updates**, and **Firmware updates**. The **update** methods include **"Local USB update"** and **"Online update"**.

Note: *To perform the software online update function, it is necessary to first connect to a wireless network; To ensure the normal update, please ensure network stability during the update process.*



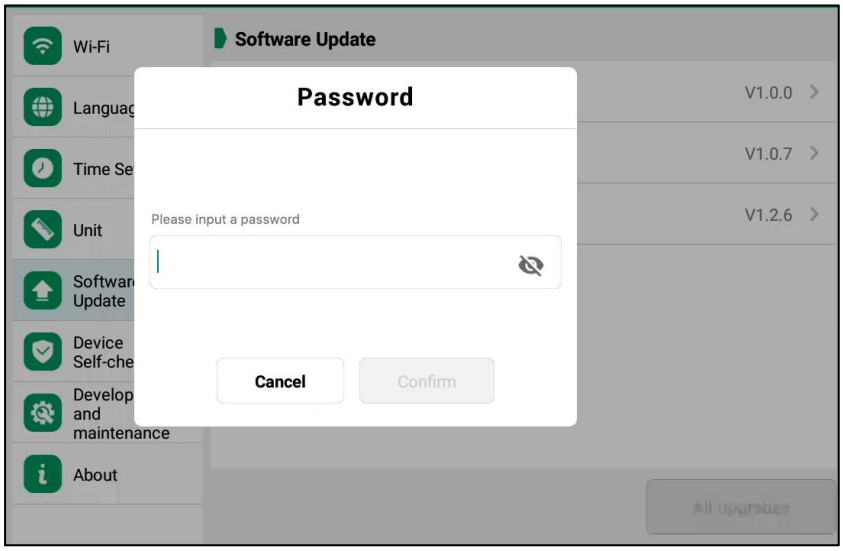
4.4.5.6 Device Self-check

Support manual self-check of the device.



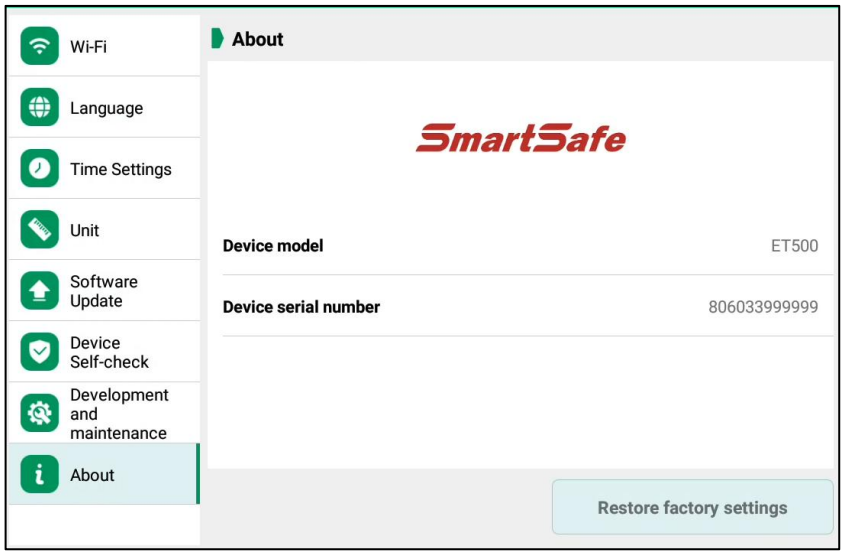
4.4.5.7 Development and maintenance

The development and maintenance functions are only for manufacturer testing purposes, and a dedicated password is required to enter this page. Unauthorized personnel are not allowed to access.

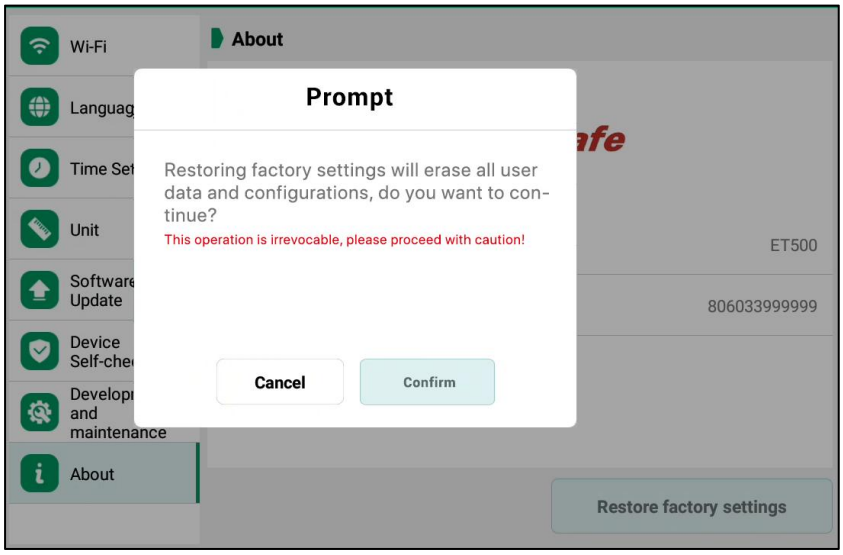


4.4.5.8 About

Used to view device model, device serial number, and restore factory settings.



Restore factory settings: used to initialize the device. Restoring factory settings will erase all user data and configurations on the device, please proceed with caution!



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SMARTSAFE electronic product is warranted against defects in materials and workmanship for one year from date of delivery to the user.

This warranty does not cover any part that has been abused, altered, used for a purpose other than for which it was intended, or used in a manner inconsistent with instructions regarding use. The exclusive remedy for any automotive meter found to be defective is repair or replacement, and SMARTSAFE shall not be liable for any consequential or incidental damages.

Final determination of defects shall be made by SMARTSAFE in accordance with procedures established by SMARTSAFE. No agent, employee, or representative of SMARTSAFE has any authority to bind SMARTSAFE to any affirmation, representation, or warranty concerning SMARTSAFE automotive meters, except as stated herein.

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Purchase Order

Replaceable and optional parts can be ordered directly from your SMARTSAFE authorized dealer. Your order should include the following information:

- Order quantity
- Part number
- Part name

Statement:

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