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1. Overview

The EP101 is a portable single-cell charge/discharge device developed by SmartSafe for cell-level maintenance and recycling scenarios. It integrates charging, discharging, capacity testing, and internal resistance detection, featuring high-precision control and multiple safety protections.

1.1 Product Features

- Compact and lightweight body, suitable for on-site mobile operations and desktop workstation testing.
- Supports up to 50 A constant current charging and discharging to meet efficient cell activation and repair needs.
- Integrates charging, discharging, capacity testing, and internal resistance testing to comprehensively evaluate cell performance and health status.
- Isolated design for voltage and current sampling channels ensures stable and reliable test results.
- Combines battery temperature monitoring with multiple protection mechanisms to enhance equipment safety.
- Supports over-voltage, under-voltage, over-current, output short circuit, reverse polarity protection, and over-temperature protection functions.
- Supports constant current and constant voltage charging/discharging modes for precise control of output current and voltage.

1.2 Main Purpose and Scope of Application

Mainly used for single-cell charging and discharging, supporting a voltage range of 1 V–5 V and high-current charging/discharging capabilities up to 50 A.

2. Safety Precautions

2.1 General Safety Practices

Follow the user manual when using this equipment.

2.2 Common Incorrect Usage or Misoperations

1) Failure to take insulation measures for operating tools.
2) Failure to follow the user manual when operating the equipment.

2.3 Potential Injuries from Incorrect Usage

1) If operating tools are not insulated, close proximity between battery pack positive and negative terminals may cause short circuit accidents.
2) Failure to follow correct operating procedures will prevent the equipment from working normally.

2.4 Emergency Measures in Abnormal Situations

Disconnect the equipment power supply and test cables.

2.5 Precautions for Special Situations

If the operator fails to take insulation measures or improper operation causes a short circuit, disconnect the cables immediately.

2.6 Other Safety Warnings

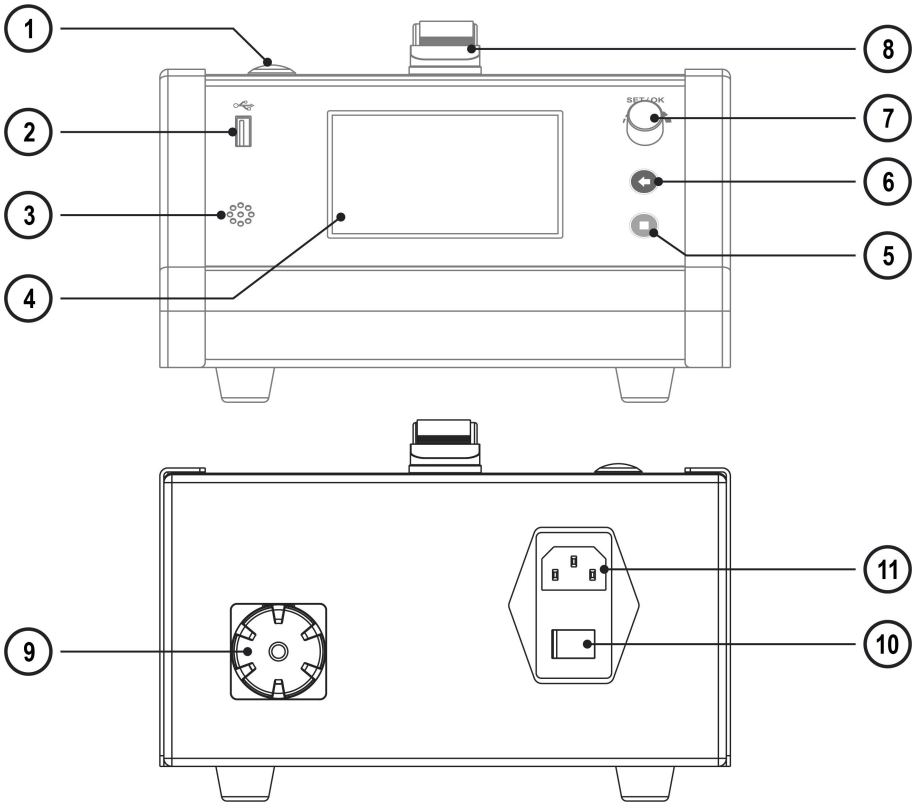
Strictly abide by safety operation regulations and correct equipment use methods.

3. Technical Parameters

Parameter Name	Description
Model	EP101
Power Supply	AC 110 V, 50/60 Hz or AC 220 V, 50/60 Hz
Voltage Accuracy	±0.2% FS + 5 mV (Max Range 5 V)
Current Accuracy	±0.5% FS + 0.1 A (Max Range 50 A)
Charge/Discharge Voltage Range	1–5 V, Voltage Resolution 0.001 V
Charge/Discharge Current Range	0.5–50 A, Current Resolution 0.1 A
Charge/Discharge Power	Max 250 W
Working Mode	Constant Current Charging, Constant Current Discharging
System Protection	Battery Over-temperature Protection, System Over-temperature Protection, Short Circuit Protection, Reverse Polarity Protection, Disconnection Protection, Over-current Protection, Over-voltage Protection, Under-voltage Protection
Display Screen	4.3-inch, Resolution 480*272
Data Storage	USB Flash Drive
Dimensions	214.0 x 358.3 x 142.8 mm
Operating Environment	
Cooling	Forced Air Cooling
Operating Temperature	-5 °C – 45 °C
Storage Temperature	-20 °C – 70 °C
Operating Humidity	10% – 90%
Altitude	Rated Altitude 2000 m

4. Operation

4.1 Equipment Interfaces and Buttons

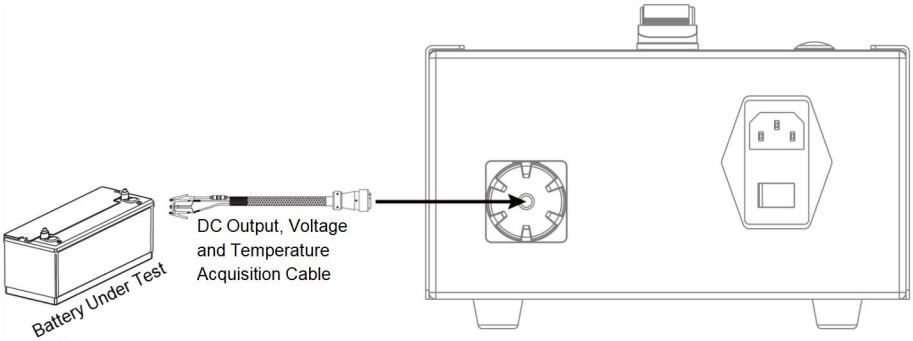


No.	Name and Description
1	**Working Status Indicator Light** Solid Green: Equipment in Standby; Flashing Green: Equipment Working; Flashing Red: Equipment Fault/Stop Warning.
2	**USB Port** Used for exporting data and upgrading via USB flash drive.
3	**Buzzer Hole** Used to emit alarm sounds.
4	**Screen**
5	**Stop Key** Used to immediately terminate the current working process.
6	**Return Key** Used to return to the previous interface or exit the current operation.
7	**Knob** Used for menu navigation and parameter adjustment; press to confirm selection.
8	**Handle**
9	**Output Port** Used to insert the DC Output, Voltage and Temperature Acquisition Cable plug and

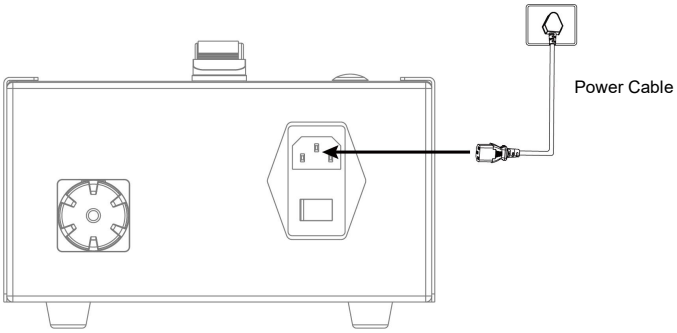
	connect to the battery positive terminal, negative terminal, and temperature acquisition point.
10	**Power Switch** Used to turn the equipment power on or off.
11	**Power Socket** Connect AC power.

4.2 Equipment Connection

(1) Insert the test connector of the DC Output, Voltage and Temperature Acquisition Cable into the "**Output Port**" of the equipment. Connect the red clips of the two sets of clip wires at the other end to the positive terminal of the battery, and the black clips to the negative terminal of the battery (large clips are for current input, small clips are for voltage sampling); connect the probe end of the temperature acquisition line to the battery cell.



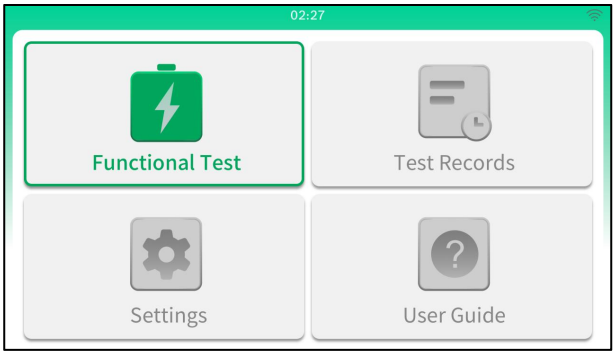
(2) Use the power cable equipped with the device to connect the equipment power interface and the power socket to supply power to the equipment.



4.3 Main Menu

(1) After connecting the equipment, turn on the power switch to start the equipment, then set the charge/discharge parameters and protection conditions to start the test.

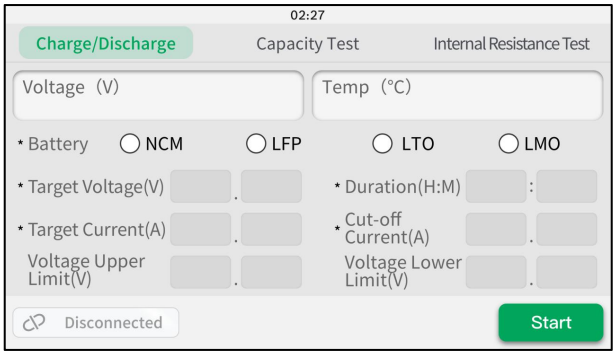
(2) After startup, the equipment enters the main interface by default. Functional modules on the main interface include **Functional Test**, **Test Records**, **System Settings**, and **User Guide**. Rotate the knob to switch between selected functional modules, and press the knob to enter the corresponding functional module page.



4.4 Functional Test

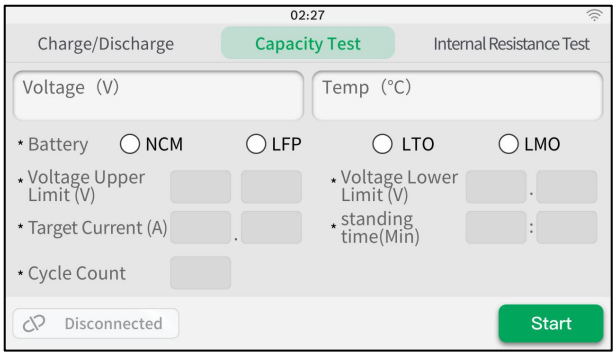
(1) In the main interface, rotate the knob to select the **"Functional Test"** option and press the knob to enter the functional test page. Functional tests include Charge/Discharge Test, Capacity Test, and Internal Resistance Test. First, select the test item and set the parameters for the corresponding test item.

Charge/Discharge Test Parameter Settings:



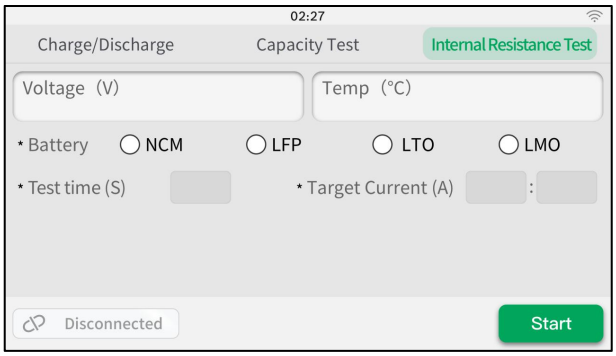
Parameter Description	
Voltage	Displays the real-time voltage status of the currently connected battery.
Temperature	Displays the real-time operating temperature of the currently connected battery.
Battery Type	Select the type of battery to be tested.
Target Voltage	Set the target voltage value to be reached during the test process. The equipment will automatically determine whether to charge or discharge based on the current battery voltage and the target voltage.
Target Current	Sets the current value to be maintained during the test process.
Voltage Upper Limit	Set the maximum voltage allowable during battery testing to prevent over-voltage.
Voltage Lower Limit	Set the minimum voltage allowable during battery testing to prevent under-voltage.
Cut-off current	During operation, when the specified target voltage is reached, the working current will drop to this set value and then cease
Duration	Sets the duration for the current test plan.
Connection Status	Indicates the current connection status between the equipment and the battery (Disconnected/Connected).

Capacity Test Parameter Settings:



Parameter Description	
Voltage	Displays the real-time voltage status of the currently connected battery.
Temperature	Displays the real-time operating temperature of the currently connected battery.
Battery Type	Select the type of battery to be tested.
Voltage Upper Limit	The maximum charging voltage allowed during the capacity test, used to determine the battery's full charge state and prevent overcharging and over-voltage.
Voltage Lower Limit	The minimum discharging voltage allowed during the capacity test, used to determine the battery's empty state and prevent damage from over-discharging.
Target Current	Sets the current value to be maintained during the test process.
Standing Time	Battery standing time between charge and discharge steps.
Cycle Count	Sets the number of charge/discharge cycles to be repeated for the capacity test.
Connection Status	Indicates the current connection status between the equipment and the battery (Disconnected/Connected).

Internal Resistance Test Parameter Settings:

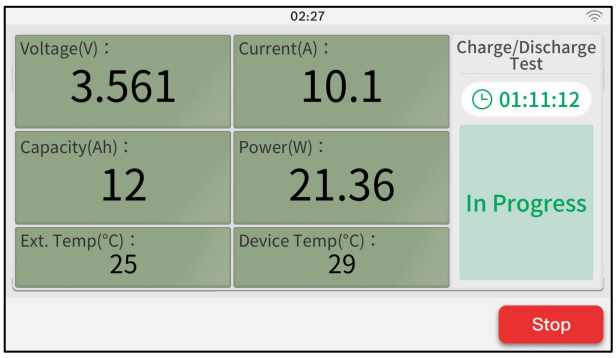


Parameter Description	
Voltage	Displays the real-time voltage status of the currently connected battery.
Temperature	Displays the real-time operating temperature of the currently connected battery.

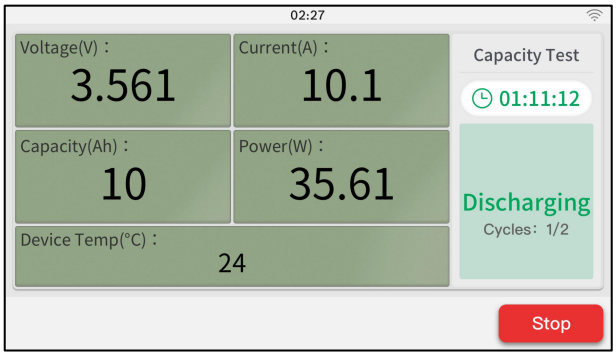
Battery Type	Select the type of battery to be tested.
Test Time	Set the operation duration of this test plan.
Target Current	Sets the current value to be maintained during the test process.
Connection Status	Indicates the current connection status between the equipment and the battery (Disconnected/Connected).

(2) After setting the parameters, select **"Start"** using the knob and press the knob to begin the test. The user can observe various parameters on the screen during the test.

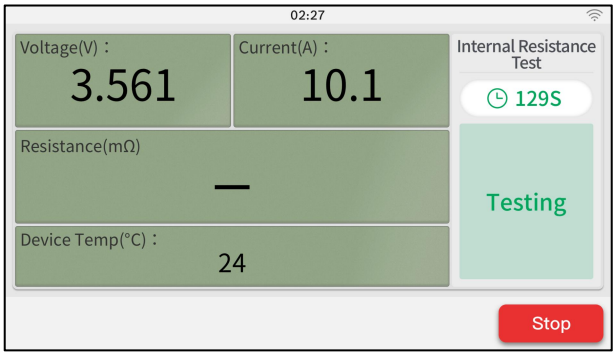
Charge/Discharge Test Page:



Capacity Test Page:



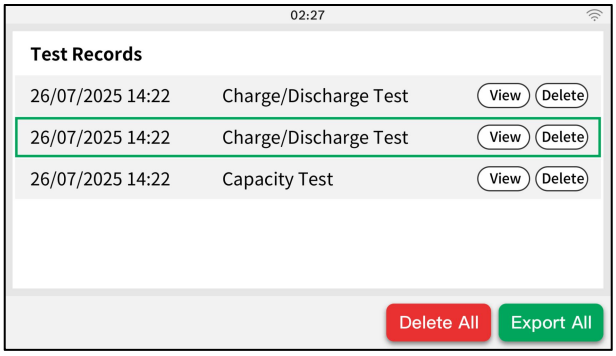
Internal Resistance Test Page:



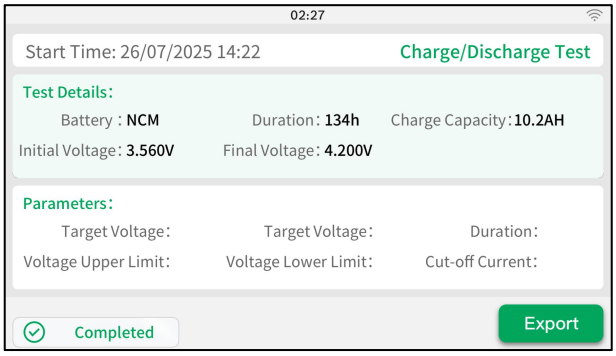
(3) Select **"Stop"** using the knob and press the knob to stop the current test.

4.5 Test Records

1) In the main interface, rotate the knob to select the **"Test Records"** option and press the knob to enter the Test Records page.



2) Rotate the knob to select a single record, then select the **"View"** option to view the record details or select the **"Delete"** option to delete the record.



Insert the USB flash drive into the USB port on the device, rotate the knob to select the **"Export"** option to transfer the test record to the USB flash drive.

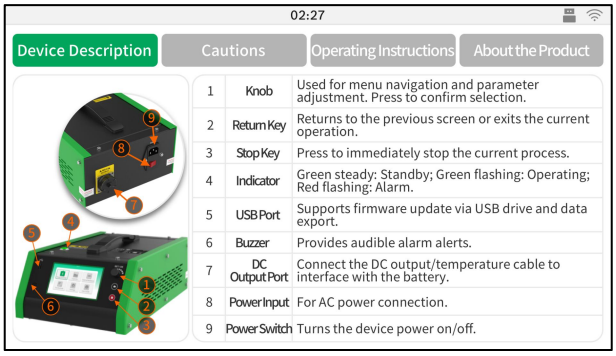
3) In the Test Records page, rotate the knob to select the **"Delete All"** option to delete all saved test records.
4) In the Test Records page, rotate the knob to select the **"Export All"** option to transfer all test records to the USB flash drive.

4.6 User Guide

In the main interface, rotate the knob to select the **"User Guide"** option and press the knob to enter the User Guide page. The User Guide page includes Device Description, Cautions, Operating Instructions, and About the Product. Use the knob to switch between different options.

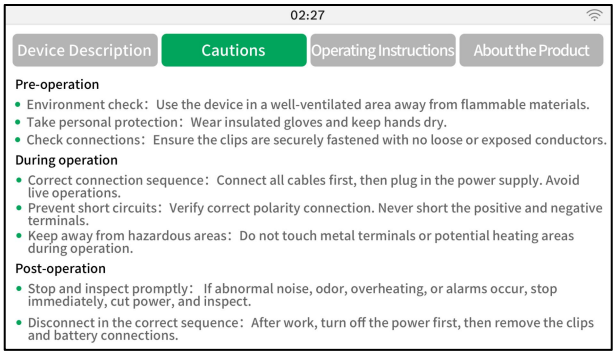
4.6.1 Device Description

This page contains the device overview and functional descriptions of device controls.



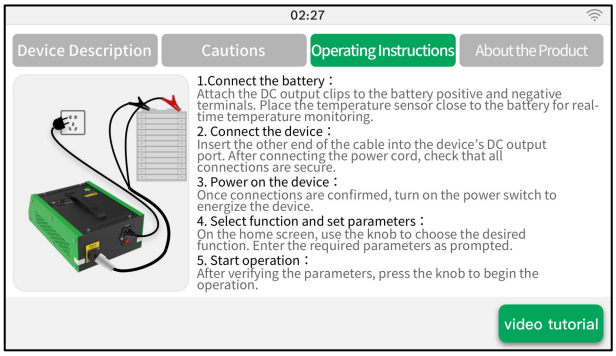
4.6.2 Cautions

This page primarily introduces precautions before, during, and after equipment operation.



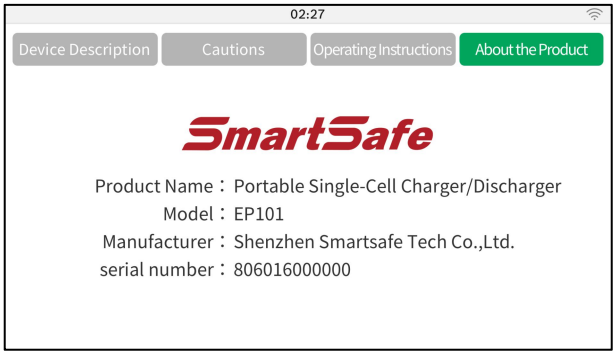
4.6.3 Operating Instructions

This page introduces the main steps for battery connection, equipment connection, and operation. Select the **"Video Tutorial"** option in the bottom right corner using the knob to view the introductory video on equipment operation.



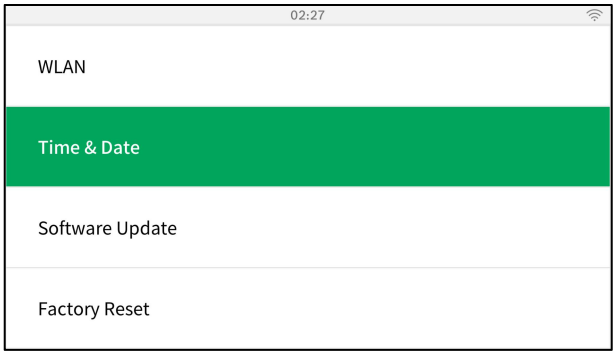
4.6.4 About the Product

This page displays information such as product name, product model, manufacturer information, and equipment serial number.



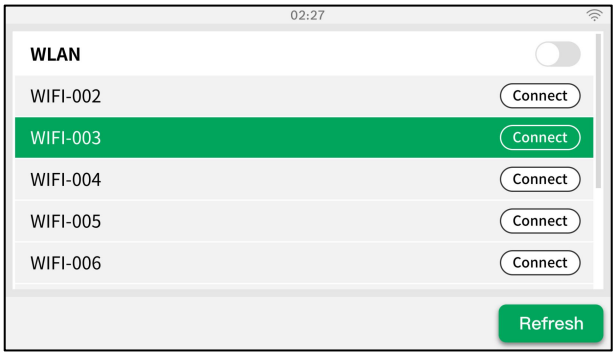
4.7 System Settings

In the main interface, rotate the knob to select the **"System Settings"** option and press the knob to enter the System Settings page. The System Settings page includes WLAN, Time & Date, Software Upgrade, and Factory Reset. Use the knob to switch between different options.



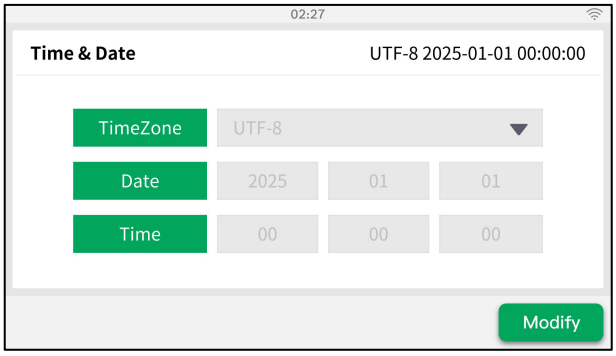
4.7.1 WLAN

Used for setting the device's wireless network connection.



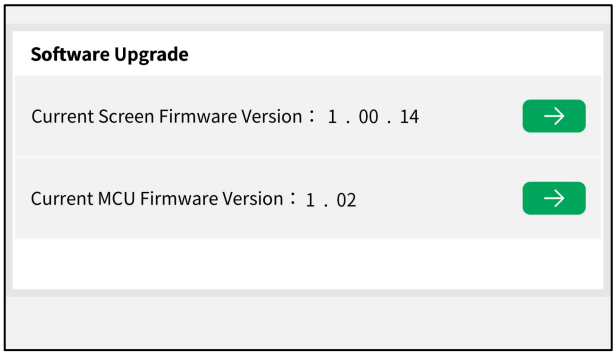
4.7.2 Date & Time

Used for setting the date, time, and time zone.

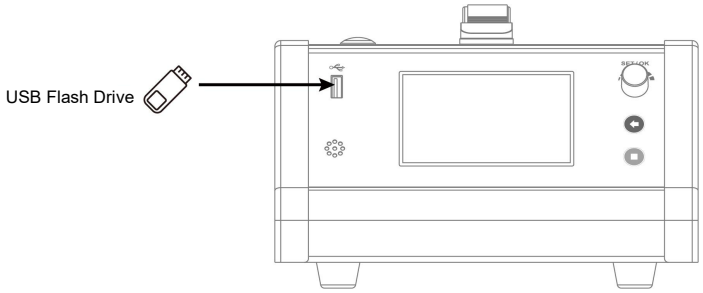


4.7.3 Software Upgrade

Used to view the version numbers of the screen firmware and MCU firmware. Select the arrow button to the right of the version number using the knob to update the screen firmware or MCU firmware to the latest version.

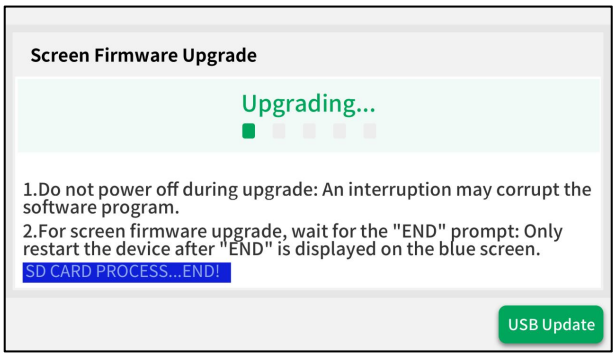


1) Insert the USB flash drive containing the update files into the USB port on the device.



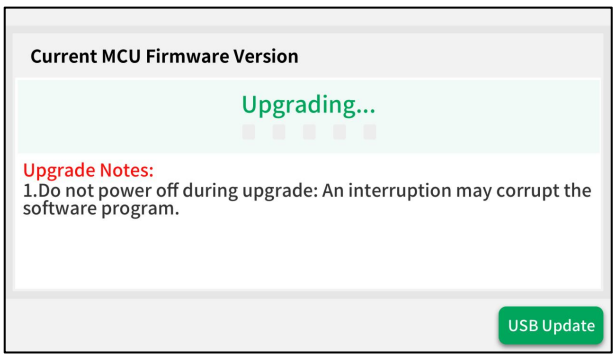
2) **Screen Firmware Upgrade:** Rotate the knob to select the arrow button to the right of the screen firmware version number to start the screen firmware upgrade. During the upgrade, the screen will turn blue. Wait for the blue screen interface to display **"END"** before restarting the device to complete the screen firmware upgrade.

Note: Do not power off during the upgrade process, as this may cause damage to the software program.



MCU Firmware Upgrade: Rotate the knob to select the arrow button to the right of the MCU firmware version number to start the MCU firmware upgrade, and wait for the upgrade to complete.

Note: Do not power off during the upgrade process, as this may cause damage to the software program.



4.7.4 Factory Reset

Used to restore the device configuration to the factory state. This operation will delete personal data and custom settings; please proceed with caution.

Warranty

THIS WARRANTY IS EXPRESSLY LIMITED TO PERSONS WHO PURCHASE SMARTSAFE PRODUCTS FOR PURPOSES OF RESALE OR USE IN THE ORDINARY COURSE OF THE BUYER'S BUSINESS.

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.

Disclaimer

The above warranty is in lieu of any other warranty, expressed or implied, including any warranty of merchantability or fitness for a particular purpose.

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:

SMARTSAFE reserves the rights to make any change to product designs and specifications without notice. The actual object may differ a little from the descriptions in the manual in physical appearance, color and configuration. We have tried our best to make the descriptions and illustrations in the manual as accurate as possible, and defects are inevitable, if you have any question, please contact local dealer or after-sale service center of SMARTSAFE, SMARTSAFE does not bear any responsibility arising from misunderstandings.