AUTEL®

MaxiEV BCE100
LITHIUM BATTERY BALANCER
USER MANUAL

CONTENT

1. OVERVIEW

MaxiEV BCE100 Lithium Battery Balancer is developed to solve cell voltage imbalance quickly. Avoid the impact of overcharge and over-discharge on the battery caused by the unbalanced voltage of the cell, and eliminate the capacity deviation caused by self-discharge and inconsistent Coulomb efficiency.

With high precision, fast maintenance, safety and reliability, and a wide range of applications, it significantly improves the consistency of the battery pack and increases the battery's service life. It supports creating any voltage difference between cells to simulate the battery's performance under harsh working conditions, which is suitable for R&D experiments.

1.1 Features

● **Wide application:** has a wide voltage range and is suitable for cell balancing of li-ion battery modules/packs with different voltage levels on the market.

● **Flexible working mode:** charging, discharging, and balancing modes are free to select for convenient testing.

● **Battery balancing:** fully activate lithium battery performance.

● **Independent channel design:** cells testing in separate channels, users can freely select the cell in the module/pack to be tested.

● **Voltage clamped:** constant voltage and reduces current, ensure that the voltage of the cells in the battery is infinitely close to the target voltage to improve the equalization effect.

● **Multiple protections**: It supports providing various test thresholds and adequate protection for different abnormal conditions during the test process. The system triggers the automatic termination of the test; the LCD prompts and beep warning to assist users in proper processing.

- **Highly intellectualization**: using an intelligent operating system, large screen interaction, straightforward operation, and humanized UI design makes maintenance work more intelligent, efficient, and accurate.

- **Customized test harness:** supports multi-types of port pin definition of battery for bridging transit testing.

- **Ample space internal memory:** supports uninterrupted auto data storage during the test to avoid data loss when accidental power is down.

- **Remote system upgrade:** convenient for new function upgrades and device failure location by remoting.

- **Expandable functions:** reserved extend port for function expansion.

- **Calibration correction:** the voltage and current values measured by the device can be calibrated and corrected at any time to ensure measurement accuracy.

1.2 Main Functions

It is mainly used for battery cell charging, discharging, and balancing maintenance, which is suitable for the voltage level of the battery module.

1.3 System Component Unit

MaxiEV BCE100 configures with the main unit, cell acquisition kit, temp acquisition wire, AC power cord, USB disk, and carrying case. Please check the actual configuration subject to the packing list.

The main unit is organized by LCD touch screen, data processing unit, data acquisition unit, auxiliary power unit, discharge unit, charge unit, equalization unit, and panel operating unit.
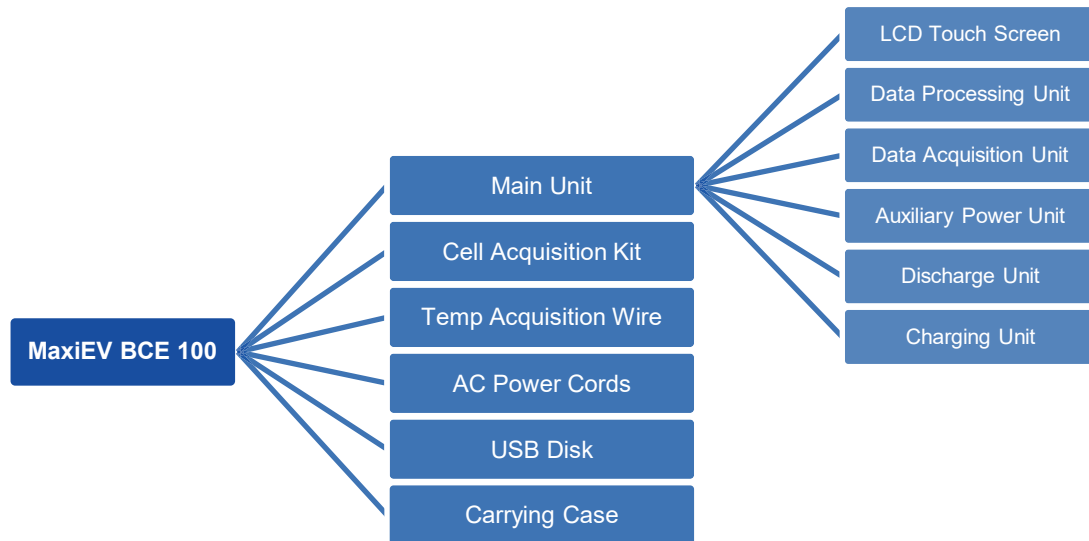
1.4 Impact on the Environment and Energy

The built-in load of the device discharges the battery. The discharge test will convert the battery's chemical energy into heat energy. Please notice heat dissipation and ventilation of the test area.

1.5 Device Safety

The device is equipped with multiple protections, including reverse connection, overvoltage, overcurrent, overtemperature, and communication security.

2. Safety Precautions

2.1 Operator Requirements

⚠ **Alarm**

1) Operators are required to receive training related to the use before operating.

2) Before operating, operators should read the user manual and the related regulations.

2.2 Operating Environment

⚠ **Alarm**

1) Operating temperature: -5~50°C

2) Relative humidity: 0~90% (40±2°C), rainy-day outdoor use is prohibited.

3) Non-corrosive, explosive, and destructive insulation gases and conductive dust of the test environment are required.

4) Ensure ventilation of the operating environment.

2.3 Connection Precaution

⚠ **Alarm**

1) Ensure the unit's AC input switch stays off before connecting the cables.

2) Please strictly follow the instructions to connect the cables properly.

⚠ **Danger**

1) Warning signs need to be placed in the test work area to avoid the risk of tripping over the cable.

2) Place the equipment properly to avoid danger caused by equipment movement during the test.

⚠️ **Danger**

When the equipment is running, it is necessary to ensure that the air inlet and outlet are free of obstructions.

2.4 Operating Precautions

The operation of the device is by touching the screen input. Please follow the screen prompts.

⚠️ **Danger**

The working power of this device is AC input. Please make sure the operating power is reliably grounded.

2.5 Common Misoperation

1) Operating tools are not insulated.

2) Operating the device without following the user manual.

2.6 Possible Damage Caused by Misoperation

1) The operating tool is not insulated. The positive and negative poles of the battery pack are too close to cause a short circuit accident.

2) The test will not commence if the device is not operated properly.

2.7 Emergency Treatments on Abnormal Conditions

Disconnect the unit's operating power and test cables.

2.8 Precaution of Special Conditions

If the operator does not make insulation measures or causes a short circuit due to improper operation, disconnect the cable in time.

2.9 Other Safety Warnings

Strictly observe safe operating practices and correct operation methods.

3. Main Technical Parameter

Model:	MaxiEV BCE100
Test Technical Index	
Test Cell Qty	max 2 packs and 12 cells(max) per pack; (supports 2×12 / 1×24)
Voltage Range	1.800~4.200V (max)
Voltage Detection Accuracy	±0.1%FS±2mV
Current Range	0.1~5.000A (max)
Current Detection Accuracy	±1%FS±0.05A
Temperature Detection Accuracy	±2°C (-25°C~85°C)
Test Power	600W (max)
Test Port	Equalization Port: 16pin*2; Temperature Port: 24pin*2
Charge Mode	constant current + constant voltage
Discharge Mode	constant current (constant power/constant resistance customizable)
Protection	overcurrent and overvoltage protection for input and output
Communication	• PC comm: (customizable), USB • Data dump: USB • Wireless comm: WLAN (WIFI antenna external) *Note: This device is a testing tool not intended for communication. The wireless comm method is reserved for function extension. It is not required during regular operation and can be turned off through settings.*
Working Condition	
Cooling Mode	forced-air cooling
Temperature	working: -5~50°C; storage: -20~70°C
Humidity	RH: 0~90%(40±2°C)
Rated Altitude	2000m
Working Power	
Voltage	100-264Vac single-phase three-wire/max 10A/ frequency: 45~65Hz
Withstand Voltage	input-shell: 2200Vdc 1min / input-output: 2200Vdc 1min / output-shell: 700Vdc 1min
Mechanical Character	
Display	7-inch TFT LCD screen, 1024*600
Dimension / Weight	496x246x262mm / 14kg

4. Installation

It is a portable device and does not involve installation.

5. Device Description

5.1 Panel Description

Lithium Battery Balancer

| No.	Part Name	Description
1	Carrying Handle	easy to move the device
2	Operating Screen	7-inch LCD touchscreen
3	⟵•⟶	USB port for data download and system update
4	EXTEND	extend port; reversed for communication expansion
5	AC INPUT	100~264Vac single-phase three-wire input
6	AC Power Switch	device power switch
7	Antenna	To enhance the received signal
8	BATTERY 1# Equalization Unit Port	16pin, 1# unit equalization harness socket, max 12cells per unit
9	BATTERY 1# Temp Acquisition Port	24pin, 1# unit temperature acquisition port (optional function)
10	BATTERY 2# Temp Acquisition Port	24pin, 2# unit temperature acquisition port (optional function)
11	BATTERY 2# Equalization Unit Port	16pin, 2# unit equalization harness socket, max 12cells per unit

5.2 Pin Definition

5.2.1 Equalization Port (16Pin)
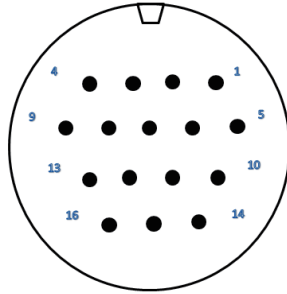
No.	Definition	Note	No.	Definition	Note
1	cell 1# -	B1-	9	cell 8# +	B8+
2	cell 1# +	B1+	10	cell 9# +	B9+
3	cell 2# +	B2+	11	cell 10# +	B10+
4	cell 3# +	B3+	12	cell 11# +	B11+
5	cell 4# +	B4+	13	cell 12# +	B12+
6	cell 5# +	B5+	14	null	Non-welded
7	cell 6# +	B6+	15	null	Non-welded
8	cell 7# +	B7+	16	null	Non-welded

5.2.2 Temperature Port (24Pin)
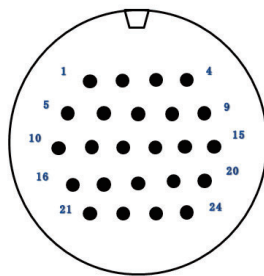
No.	Definition	Note	No.	Definition	Note
1-16	null		21	temp 3+	T3+
17	temp 1+	T1+	22	temp 3-	T3-
18	temp 1-	T1-	23	temp 4+	T4+
19	temp 2+	T2+	24	temp 4-	T4-
20	temp 2-	T2-			

5.3 Cable Description

The following is an introduction to the test harnesses.

A. Equalization Bus-harness

For the cell equalization test; connect with the device end and sub-harness end.

B. Equalization Sub-harness (Clips-type)

For the cell equalization test; connect with cell ends follow clip marks and clip in order from B1-, B1+, B2+, …, and B12+ with the cell poles.

C. Temp Acquisition Wire

For temperature data collecting; connect with the Temp Acquisition Port of the tester and the battery.

D. AC Power Cord

100~264Vac single-phase three-wire/max 10A.
Frequency: 45~65Hz.

Note:

- *Please refer to the provided image for reference. Actual product details may vary slightly.*
- *The average service life of the harness connector is about 200-300 times. Please check and replace it regularly.*
- *Please refer to the packing list with the shipment for the actual configuration.*

6. Connecting Diagram

Please do not switch on the device before connecting!

Cables Connect Order:

1) Connect the bus-harness to the device end first;

2) Connect the sub-harness to the battery end;

3) Connect the bus-harness and the sub-harness terminals;

4) Connect the AC power cord to the battery end and the power supply.

6.1 Equalization Harness Connection

Here is a connecting diagram for reference.
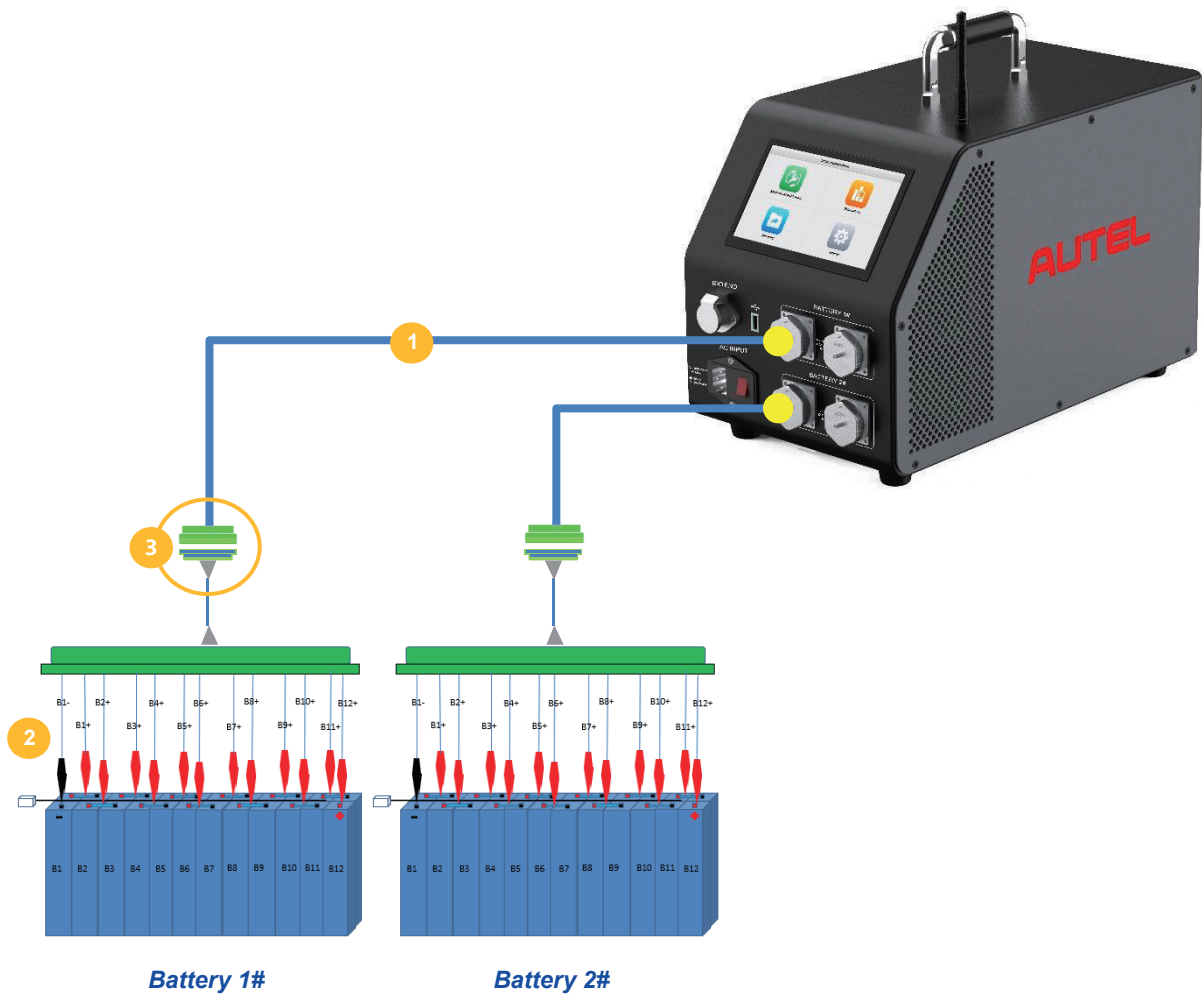
Battery 1#   Battery 2#

Connecting Order:

1 Plug equalization bus-harness to device 1# Equalization Unit Port.

2 Clip equalization sub-harness to cell poles from B1-, B1+…B12+ of the Battery 1#.

3 Connect the bus-harness and the sub-harness terminals.

Follow the steps above to connect the 2# Equalization Unit Port with the Battery 2#.

6.2 AC Input Connection

Connect the AC power cord with the AC INPUT of the tester and the power supply.

Note: Please connect the cables strictly according to the instructions. For connecting with all plugs and sockets, please observe the positioning grooves and holes, confirm the plug's correct direction, and check the connecting is fastened after joining.

7. Operating Instruction

After the device connection, turn on the AC Power Switch to start the tester. The screen will display the **_Welcome Page_**, and then automatically jump to the **_Main Menu Page_**, including **Balancing and Maintenance**, **Data Analysis**, **Data Dump**, and **Settings** function icons.

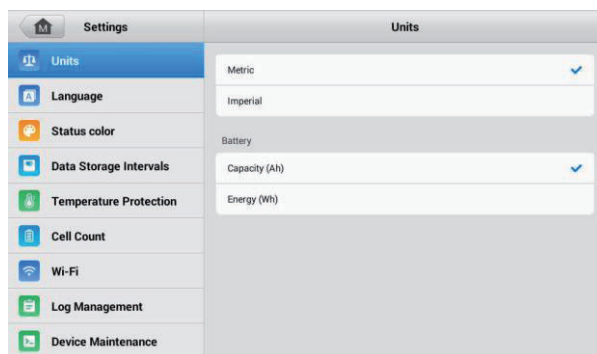
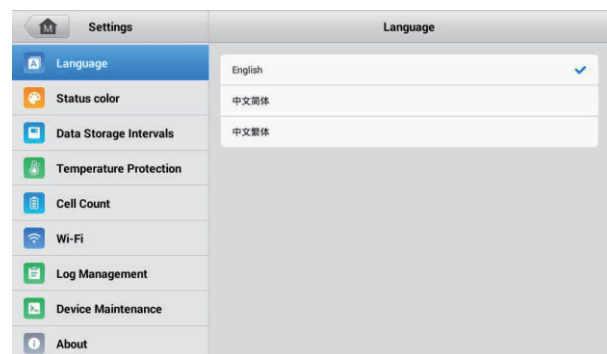Lithium Battery Balancing and Maintenance System

Welcome Page

Main Menu Page

7.1 Settings

Press the **Settings** icon on the **_Main Menu Page_** to set and modify system parameters. It has nine sub-pages: **Units**, **Language**, **Data Storage Intervals**, **Temperature Protection**, **Cell Count**, **Wi-Fi**, **Log Management**, **Device Maintenance**, and **About**.

Settings > Units


Settings > Language

7.1.1 Units

The tester provides different units of measurement for users to select by actual needs: **Metric** or **Imperial**, Battery **Capacity (Ah)** or **Energy (Wh)**.
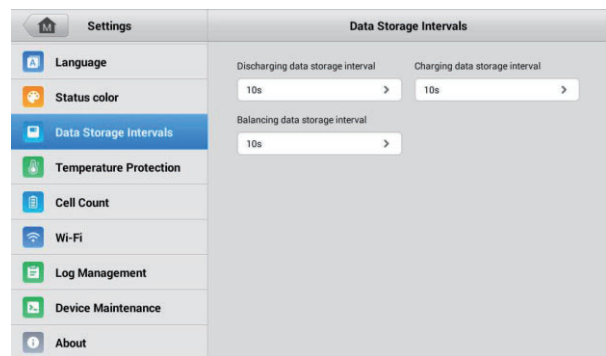
7.1.2 Language

The system language supports English, Simplified Chinese, and Traditional Chinese. Users can switch according to their needs, and then the tester will automatically reload the system.

7.1.3 Status Color

It is the function to set a different color for each test state to make all processes more intuitive for users. Users can modify colors based on their needs. Please notice to press **OK** to save the settings.
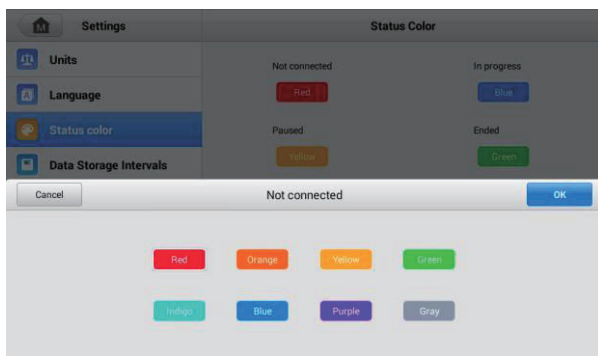
Settings > Status Color   *Settings > Data Storage Intervals*

7.1.4 Data Storage Intervals

It is for data saving interval; please set it as needed.

The tester is equipped with a data storage function, which saves cell voltage, string voltage, test current, and other test data during tests.

7.1.5 Temperature Protection

The device provides temperature protection for the various types of batteries. If the device detects that the battery temperature exceeds the preset values during the test, the LCD prompts an alarm and the test stops. The default battery temperature protection is 10~70°C. Users can modify it if needed
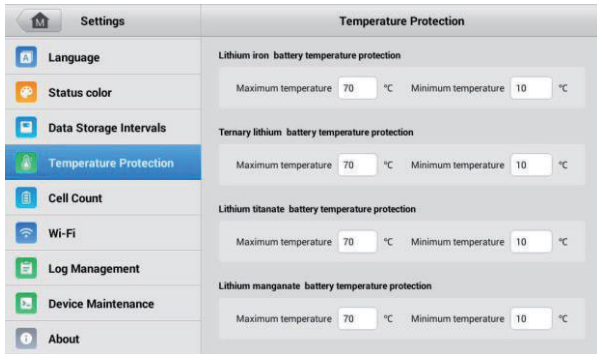
Settings > Temperature Protection
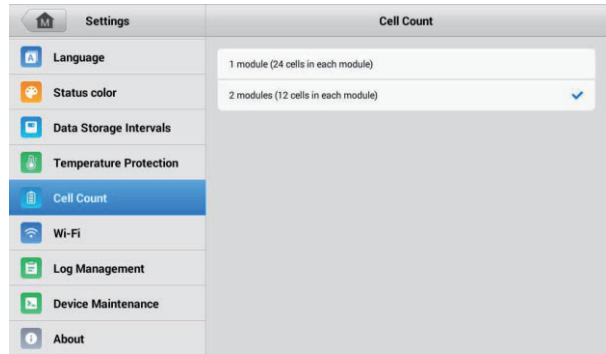
Settings > Cell Count

7.1.6 Cell Count

It supports setting battery cell quantity to meet different testing application scenarios. It can test max 24 cells simultaneously and has two options, "1 module (24 cells in each module)" and "2 modules (12 cells in each module)". Please select by actual.

7.1.7 Wi-Fi

It is for device networking. Install the antenna on the device, then choose a network to connect for remote online system update.
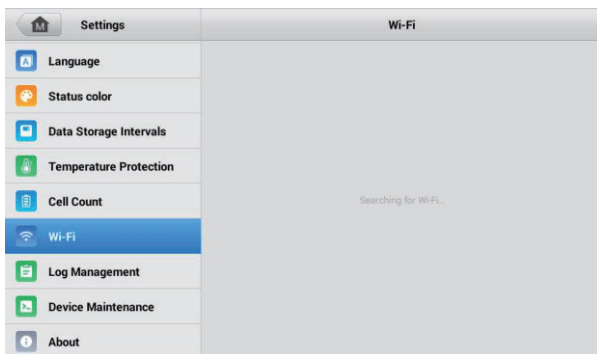
*Settings > Wi-Fi*
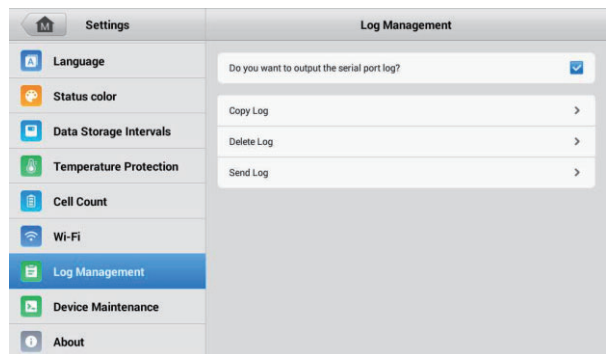
*Settings > Log Management*

7.1.8 Log Management

The running log is used for exception analysis by manufacturers. There is no need for the user to operate. Contact the manufacturer for guidance when the device is abnormal

7.1.9 Device Maintenance

It is mainly used for factory calibration and commissioning. Generally, users do not need to modify settings. A password is required to enter the page, please contact the manufacturer if necessary.
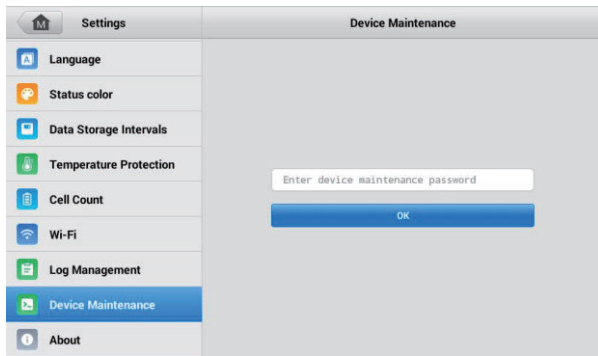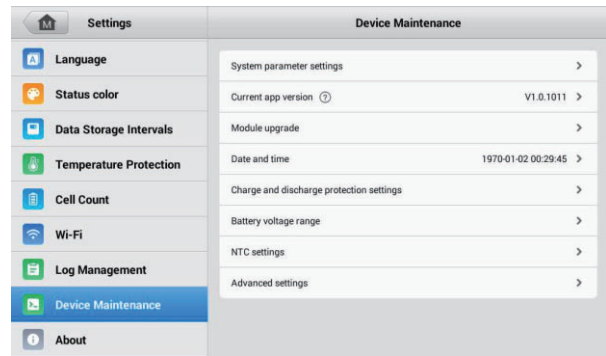
Settings > Log Management   *Settings > Device Maintenance*

This manual will introduce functions of Current app version, Module upgrade, and Date and time.

7.1.9.1 Current App Version

This item is used for local updates of the device operating system. Insert a USB disk with the updating program into the USB port of the tester. Please note to name the program update.apk and put it in the root directory. Press **Current app version** and select the upgrade program to complete the updating.

7.1.9.2 Module Update

This item is for local/online software updates of the device firmware modules.
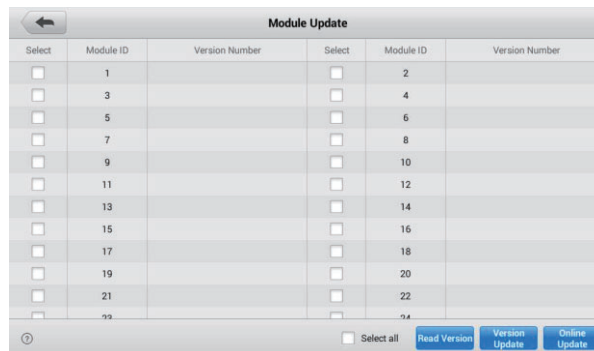
Device Maintenance > Module Update

1) **Local Update**

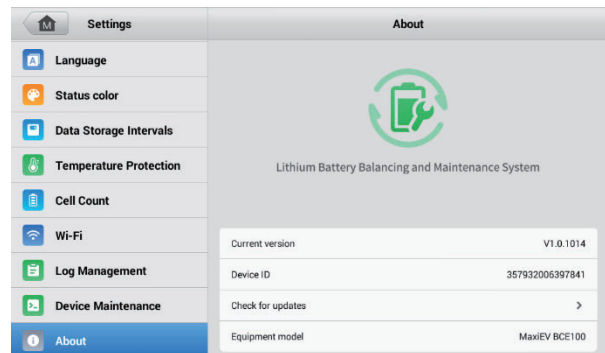**Version update** is for the local upgrades. Insert a USB disk with the updating program into the USB port of the tester. Please note to name the program Unit.bin and put it in the root directory. Check/Select All firmware modules that need to be updated, press **Version Update**, and select the updating program to complete the upgrades.

2) **Online Update**

Users need to confirm an available upgrade file with the manufacturer and send the Device ID to us. Then connect the device to an available Wi-Fi and press **Read Version** first, then press **Online Update**. The system will auto-receive the updating package.
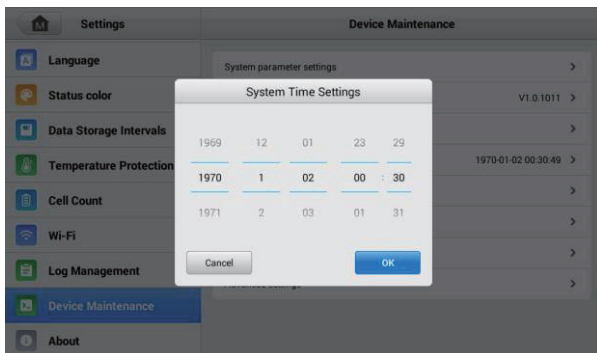
Device Maintenance > Date and Time   *About*

7.1.9.3 Date and Time

This is for system date and time calibration. Please set it by actual.

7.1.10 About

It shows the device info about the Current version of the system, Device ID, and Equipment model, and users can operate the online updating on the page through the **Check for updates** icon.

7.2 Equalization

Please go back to the ***Main Menu Page*** after confirming the **Settings**. Press the **Balancing and Maintenance** icon to enter the ***Test Page***. The equalization function supports Charging, Discharging, and balancing Mode.
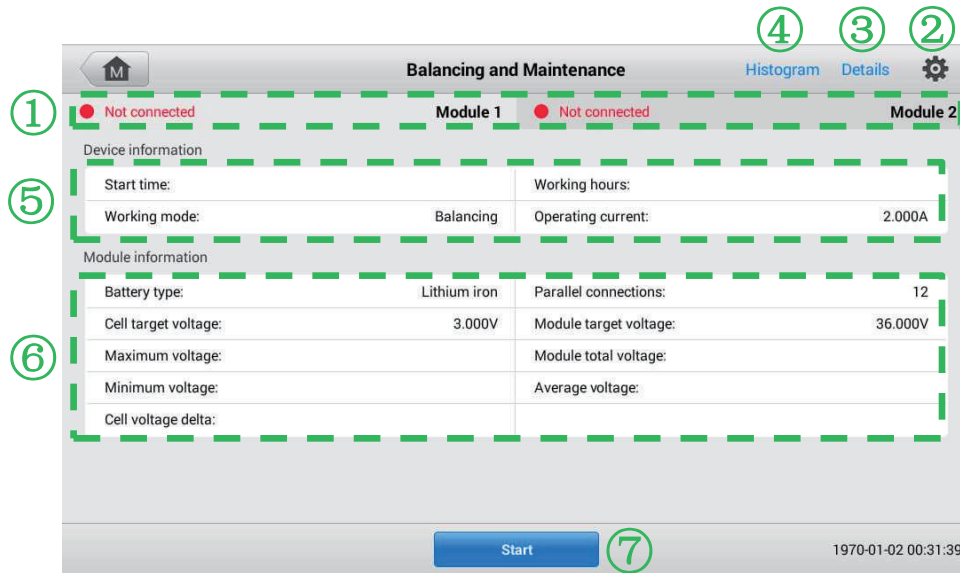
Test Page

1) **Test State**

    This area displays the test status of each module. (If "Not connected" or "Error" is displayed, please check the battery connection status.)

2) **Parameter Settings**

    The function icon is for presetting or modifying test parameters.

3) **Details**

    This function displays the details of real-time test data, including cell voltage, current, capacity, and cell test status.

4) **Cell Volt Histogram**

    This area displays the real-time cell voltage of each cell in a diagram format.

5) **Device Information**

    This area displays the real-time data of test start time and working hours. The preset parameters of the working mode and operating current are also

shown.

6) Module Information

This area displays the real-time data of the tested module.

7) Operating Item

Start/Pause/Continue/Stop buttons for control of the test.

7.2.1 Parameter Settings

Respectively pressing the Module 1# and Module 2# to set the test parameters.

Press ⚙ in the upper right corner to enter the ***Parameter Settings Page***.

Please remember to press the **Save** icon to save the setting.

Equalization > Parameter Settings Page

Parameter	Description
Module ID:	Set the module name, for the tested module recognition.
Working mode:	Set the test mode; pull down to select Charging, Discharging, or Balancing.
Battery type:	The tested battery type; pull down to select Lithium iron, Ternary lithium, Lithium titanate, and Lithium manganate.
Number of battery series:	The cell quantity in the module, pull down to select 1-12.
Test battery:	Choose the cell number to be tested (default All).
Number of temperature sensors:	Quantity of temperature sensors connected. The Qty will be 0 if the temp acquisition wire is not connected.
Voltage threshold (V):	Set the target voltage value.
Operating current (A):	Set the max test current.

7.2.2 Starting Test

Check the battery connection status and confirm whether the cell information is collected.

Press **Start** on the **_Test Page_** and confirm in the pop-up box to start the test.
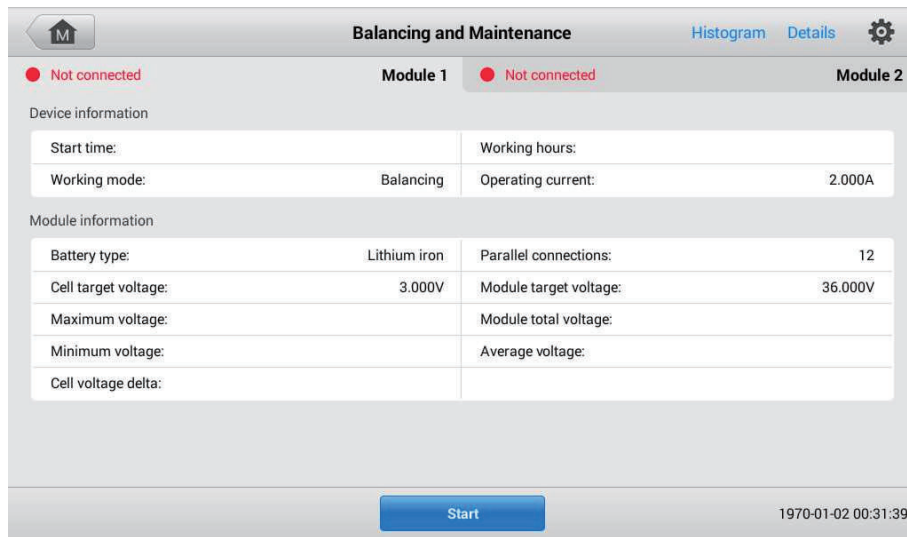
**Test Page**

The real-time battery status info will be displayed on the testing page during the test.

● If you want to double-check or modify test parameters, press ⚙ and return to the **_Parameter Settings Page_**.

● The overview of the real-time test data will be displayed on the Test Page.

Parameter	Description
Device information	
Start time:	The test start time.
Working hours:	The test duration.
Working mode:	The test mode (preset in parameter settings).
Operating current:	The test current (preset in parameter settings).
Module information	
Battery type:	The battery type (preset in parameter settings).

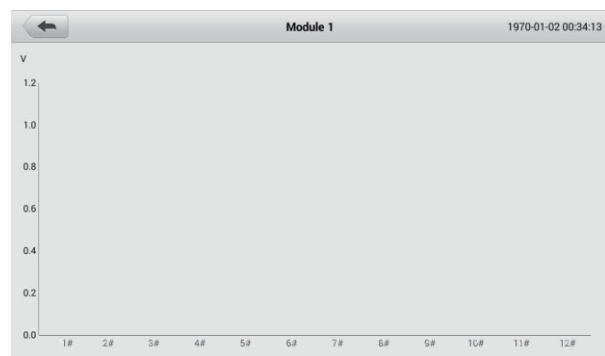| Parallel connections:	The cell quantity of the module (preset in parameter settings).
Cell target voltage:	The Voltage threshold (preset in parameter settings).
Module target voltage:	The value=Cell target voltage×Number of battery series.
Maximum voltage:	The real-time max cell voltage value of the tested module.
Module total voltage:	The sum of the real-time voltage of all battery cells.
Minimum voltage:	The real-time min cell voltage value of the tested module.
Average voltage:	The average voltage value of cells.
Cell voltage delta:	The voltage difference between the Maximum voltage and the minimum voltage.

● Users can press **Details** on the **_Test Page_** to view the real-time cell voltage, current, capacity, and status during the test.

Details   _Histogram_

● Users can press the **Histogram** on the **_Test Page_** to view the real-time cell voltage, current, capacity, and status during the test.

● After starting the test, users can select **Pause**, **Continue**, or **Stop** the test at any time by pressing the corresponding buttons on the bottom of the **_Test Page_**.

● The system will automatically stop the test when the test conditions trigger device protection.

7.2.3 Complete Condition

Test Mode	Cell Test Complete Condition		
	1. Voltage threshold	2. Real-time Current	3. Working Hours
Charge	reached	< 0.2A	> 2min
Discharge	reached	< 0.2A	> 3min
Balancing	reached	< 0.2A	> 2min

Note:

- For the charge/balancing test, when the cell voltage reaches the Voltage threshold, the test current is less than 0.2A, and the working hours is greater than 2 minutes, the cell status is displayed as **Complete** in Device Details, indicating that this cell test is completed.
- For the discharge test, when the cell voltage reaches the Voltage threshold, the test current is less than 0.2A, and the working hours is greater than 3 minutes, the cell status is displayed as **Complete** in Device Details, indicating that this cell test is completed.
- When the status of each cell shows **Complete**, the module test is complete.

7.3 Data Analysis

The tester supports the data analysis function and provides a histogram/curve format for viewing. Press **Data Analysis** to enter the page, double-click the data you want to view and switch Histogram/Curve to view data variation charts. Press the icon in the upper right corner to check the overview of the data.
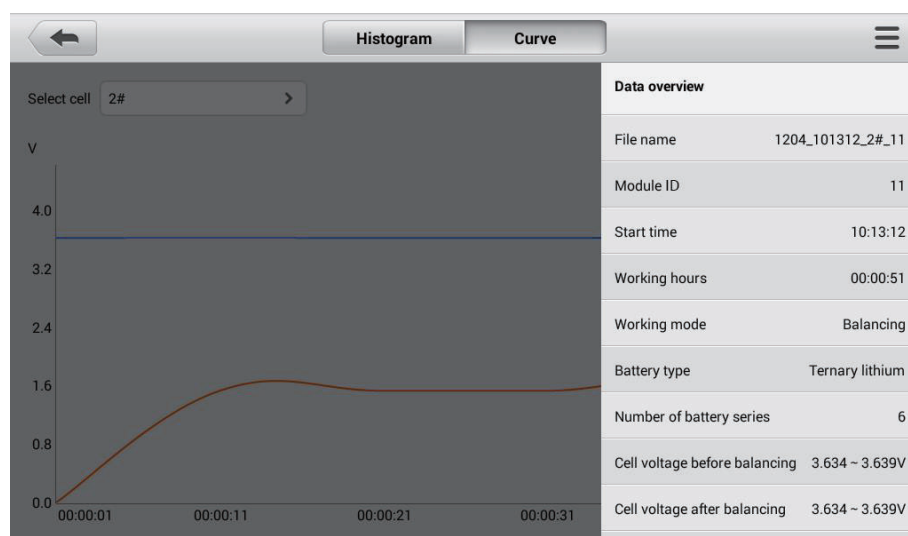
Data Analysis Page

7.4 Data Dump

This function is used for data deletion and download. Press **Data Dump** to enter the ***Data Dump Page***.

1) Delete

Select the data you want to delete or choose **Select all**, and press **Delete** to confirm the deletion.

2) Dump

Insert the USB disk into the device's USB port, select the data you want to export or choose **Select all**, and press **Dump to USB** to export data to the USB disk.
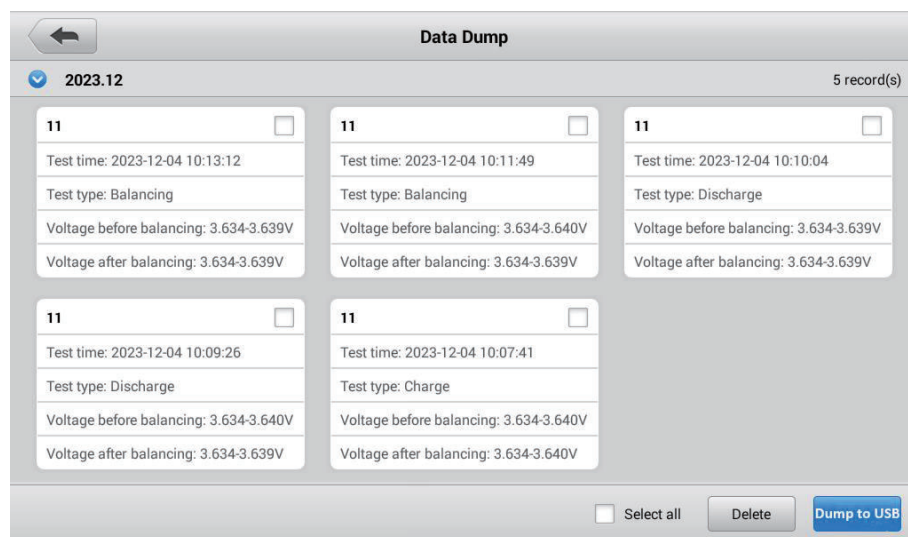
Data Dump Page

8. Repair & Maintenance

1) The warranty period of the main tester is one year from the date of receipt, and the warranty does not cover artificial damage.

2) The manufacturer provides free repair during the defects liability period and technical consulting services for a lifetime. If you have any technical problems or advice, please get in touch with us.

3) When the voltage and current accuracy of the equipment are over the range of technical specifications, please get in touch with the manufacturer for accuracy calibration.

4) When the equipment is stored for a long time, there may be dust and other dirt on the mesh cover of the heat outlet, which needs to be cleaned regularly.

9. Transportation & Storage

1) The tester is equipped with a particular carry case and transported in a carton, which is shock-resistant and reliable in transportation.

2) Storage conditions: placed in a dry equipment storage room, storage temperature: -20~70°C, humidity: <90%.

10. Environmental Statement

1) The tester uses a transport carton which is a recyclable material.

2) The main machine and other components are non-polluting sources.

FCC Caution:

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception,which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

-- Reorient or relocate the receiving antenna.

-- Increase the separation between the equipment and receiver.

-- Connect the equipment into an outlet on a circuit different

from that to which the receiver is connected.

-- Consult the dealer or an experienced radio/TV technician for help.

RF Exposure

This device complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and opera ted with minimum distance 20cm between the radiator & your body.

ISED Statement:

English:This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s).

Operation is subject to the following two conditions:

(1) This device may not cause interference.

(2) This device must accept any interference, including interference that may cause undesired operation of the device.

The digital apparatus complies with Canadian CAN ICES-3 (B)/NMB-3(B).

French: Cet appareil contient des é metteurs/r é cepteurs exempts de licence qui sont conformes aux RSS exempt é s de licence d'Innovation, Sciences et D é veloppement é conomique Canada.

L'exploitation est soumise aux deux conditions suivantes :

(1) Cet appareil ne doit pas provoquer d'interf é rences.

(2) Cet appareil doit accepter toute interf é rence, y compris les interf é rences susceptibles de provoquer un fonctionnement ind é sirable de l'appareil.

l'appareil num é rique du ciem conforme canadien peut - 3 (b) / nmb - 3 (b).

This device meets the exemption from the routine evaluation limits in section 2.5 of RSS 102 and compliance with RSS 102 RF exposure, users can obtain Canadian information on RF exposure and compliance.

cet appareil est conforme à l'exemption des limites d' é valuation courante dans la section 2.5 du cnr - 102 et conformit é avec rss 102 de l'exposition aux rf, les utilisateurs peuvent obtenir des donn é es canadiennes sur l'exposition aux champs rf et la conformit é .

This equipment complies with Canada radiation exposure limits set forth for an uncontrolled environment.

Cet é quipement est conforme aux limites d'exposition aux rayonnements du Canada é tablies pour un environnement non contrôl é .

This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

Cet é quipement doit ê tre install é et utilis é à une distance minimale de 20 cm entre le radiateur et votre corps.