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1. Product Overview

EB240 is a EV battery cell equalizer developed by Smartsafe, mainly used to balance the voltage between cells of new energy vehicle battery packs with excessive voltage difference, so as to improve battery performance and extend the life of battery pack. This product mainly achieves independent balancing control for each connected battery cell, using low voltage and low current, and accurately configuring the connected battery cells to the same voltage level according to the voltage target set by the user.

1.1 Product Features

- Adopt the latest equalizing maintenance technology and avoid the interference to BMS (Battery Management System), EB240 is designed for lithium battery pack daily discharge, charge, and equalizing maintenance.
- Based on wide voltage range design, EB240 can be applied to lithium battery packs testing with various voltage levels.
- Voltage and temperature monitoring and protection during test can prevent over-charge and overdischarge.
- Multiple discharge auto-stop conditions make testing mode more intelligent and flexible, and avoid over-charge and over-discharge.
- Intelligent equalizing function based on each cell voltage monitoring and equalizing charge.
- · Support equalizing maintenance parameter customization.
- Support multiple protection design and alarm settings of voltage, current, temperature abnormal to protect the battery and the balancer.
- Support functions such as overvoltage, undervoltage, overcurrent, output short circuit, anti-reverse protection and overheating protection.
- Adopt wave width modulation technology, high efficiency, high power factor, low noise, low electromagnetic interference.
- 10.1-inch touch screen, easy to operate.

1.2 Main Function and Test Range

Mainly used for lithium battery pack charge & discharge test and equalizing maintenance, suitable for various voltage levels.

1.3 System Components

The device consists of main unit and equalizing cables. The main unit includes color display screen, data processing unit, data monitoring unit, auxiliary power unit, power consuming unit, and panel operation unit.

1.4 Working Conditions

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

1.5 Environment & Energy Impact

Placed in a dry storage room, temperature: -20° C ~ 70° C, humidity: 10% ~ 93%.

2. Precautions for Safe Use

2.1 General Rule

Please follow the user manual to use this balancer.

2.2 Common Incorrect Operation

- 1) Tools for connecting is 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 device 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.

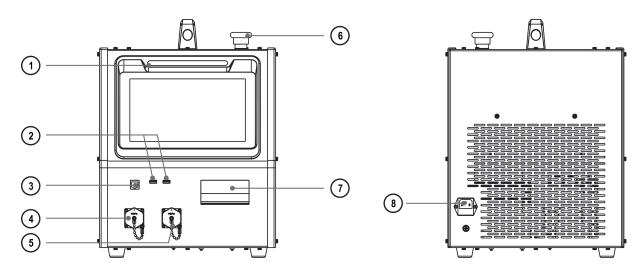
Function Parameter				
Model	EB240			
Power input	AC 90~264V, 50/60Hz			
Charging & discharging voltage range	1.8~4.2V			
Voltage measurement accuracy	±(0.1%FS±2mV)			
Charging & discharging current range	0.1~ 5A			
Current measurement accuracy	±(1%FS±0.05A)			
Battery temperature detection accuracy	±2 $^\circ\!\!\mathbb{C}$ (-25 $^\circ\!\!\mathbb{C}$ 85 $^\circ\!\!\mathbb{C}$) Charge and discharge temperature range is settable			
Max channel quantity in	2 string x Max 12 cells			

3. Technical Features

single unit			
Charging & discharging power	600W Max		
Voltage & temperature test port	24Pin*2		
Display	10.1-inch TFT LCD screen, resolution 1280*800		
PC Data communication	TCP/IP , USB-Device		
Wireless communication	Wi-Fi		
Data transfer	Internal storage of device or data transfer to USB flash drive		
Charging mode	Constant current charging + constant voltage charging		
Discharge mode	Constant current (constant power, constant resistance discharge selectable)		
Protection mechanism	Overcharge and over discharge protection Over voltage, over current, over temperature protection Battery short connection, reverse connection protection Abnormal protection against power cord and main cable failure Fan abnormal protection		
	Safety Testing		
Procking down toot	AC input-metal shell: 2200Vdc 1min		
Breaking down test	DC input-metal shell: 2200Vdc 1min		
	Working Environment		
Cooling	Forced air cooling		
Working Temperature	-5℃ ~ 45℃		
Working Humidity	5% ~ 93%		
Size and Weight			
Dimension	500.5 x 337.8 x 445.7 mm		

4. Operating Instructions

4.1 Device interface and buttons

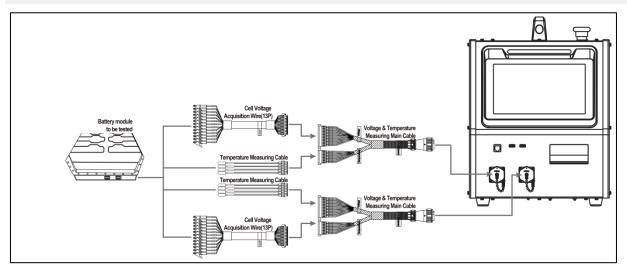


No.	Name	Description
		Green constant light indicates that the device is in standby mode;
1	Light strip	Blue constant light indicates work in progress;
		Yellow constant light indicates a non-stop warning;
		Red flashing indicates a fault/shutdown warning.
2	USB interface	Used to export data.
3	Communication interface	Used for communication and other expandable functions.
4	Channel 1 port	Connect to the channel 1 of the voltage and temperature measuring main cable.
5	Channel 2 port	Connect to the channel 2 of the voltage and temperature measuring main cable.
6	AC circuit breaker	Turn on/off the AC input.
		Used to cut off the power supply of the device in an emergency and stop the device immediately.
7	Emergency stop switch	After pressing this emergency stop switch button, the emergency stop switch must be turned to the right to reset it before the AC circuit breaker can be closed again.
8	Power socket	Connect the AC power cord.

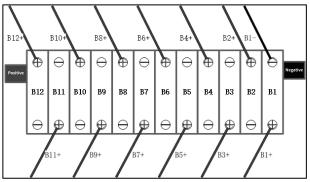
4.2 Connection Method

- Insert the aviation plug of the voltage & temperature measuring main cable into the Channel 1/Channel 2 port, and connect the other end to the cell voltage acquisition wire and temperature measuring cable.
- 2) Connect the cell voltage acquisition wire and temperature measuring cable to the cell being tested.
- 3) Insert the power cord into the power input port of main unit, and connect the other end to the power source.

Note: Please make sure to turn off the power of the device before connecting the voltage & temperature measuring main cable to avoid damage to the device.



4.2.1 Cell Voltage Acquisition Wire and Battery Pack Connection



According to the wire label on the cell voltage acquisition wire, B1 - is connected to the negative electrode of No. 1 cell (B1), B1 + is connected to the positive electrode of No. 1 cell (B1), B2 + is connected to the positive electrode of No. 2 cell (B2), and connected in sequence.

Note: the nearest to the negative terminal of the battery module is the No. 1 cell.

4.2.2 Working Power Supply Connecting

Connect the power supply cord with the main unit power socket, and please ensure AC power supply can support Single phase 90~264V AC Max 10Amp output.

4.3 Main Unit Operation

After the device is connected, close the AC circuit breaker and turn on the device.

4.3.1 Main Menu

After the device is turned on, it enters the balancing interface by default. Users can click the function module icon on the left side of the screen to switch to different function module interfaces. The function modules on the left include **Balancing**, **Record**, **Update** and **Settings**.

SmartSa	n fe Ba	attery Cell Equaliz	er	奈(^{08:32 AM} 2024-12-16
F Balancing	Module NO.: Target Vol(V): 0.0 Cell Voltage De 0	Cell Type: Max Voltage (V): Balancing Time:	0.000 Min Voltage (
	Channel 1	Not Connected	Channel 2	2 Not Connected
Ec	Highest Voltage(V)	0.000 -	Highest Voltage(V)	0.000 -
Record	Lowest Voltage(V)	0.000 -	Lowest Voltage(V)	0.000 -
	Cell Voltage Deviation(mV)	0	Cell Voltage Deviation(mV)	0
	Cells Connected	0	Cells Connected	0
Update	Max Temperature (°C)	-	Max Temperature (℃)	-
	Min Temperature (°C)	-	Min Temperature (°C)	-
Settings			Settings Details	Start

4.3.2 Balancing

1) In the balancing interface, click **Settings** to preset the balancing test parameters.

Module NO.:		Cell Type	
		NCM	
Enter the module Name			
Nominal Capacity		Connected Cell Count	
	kWh	2	
		Enter 1 ~ 24	
Target Voltage		Balancing Initial Current	
	V	5.0 A	
Enter 3.0 ~ 4.2		Enter 0.05 ~ 5.0	
Terminate Current			
0.05	A		
		Back Confirm	n

Name	Description
Module NO.	Battery module number.
Cell Type	Select the type according to the battery to be tested, supporting ternary lithium batteries, lithium titanate batteries, lithium manganese batteries and lithium iron phosphate batteries.

Nominal Capacity	The nominal capacity of the battery pack, according to the actual input, can be identified from the rating plate.
Connected Cell Count	Number of cells in series, according to the actual number of battery strings contained in the connected battery pack module.
Target Voltage	Cell balancing target voltage value.
Balancing Initial Current	The balancing initial current value.
Terminate Current	Current threshold for terminating balancing.

The parameter settings interface defaults to normal mode. To enter expert mode to set more parameter items, you can click on the **Settings** function module on the left side of the screen to enter the system settings interface. Click on **Expert Mode** in the system settings interface and then enter the parameter setting interface.

	5.0 A
Enter 3.0 ~ 4.2	Enter 0.05 ~ 5.0
Terminate Current	Battery Temperature Warning Threshold
0.05	0°
	Enter 10 ~ 70
Terminate Cable Voltage Drop	Alarm Cable Voltage Drop
6000	4000 mV
Enter 0 ~ 9999	Enter 0 ~ 9999
Adjusting Times	Over-charging/Over-discharging Protect Voltage
3	50 mV
Enter 0–9(0 represents Unlimited)	Enter 0 ~ 999
Data Save Interval	
105	·

The following parameters can only be set in Expert Mode.

Name	Description
Battery Temperature Warning Threshold	Temperature threshold for battery cell over-temperature protection.
Terminate Cable Voltage Drop	Cable voltage drop threshold used to terminate balancing.
Alarm Cable Voltage Drop	Cable voltage drop threshold for alarming .
Adjusting Times	Set the balancing cycles to achieve more precise cell balancing, range 0~9, with 0 representing infinite cycles.
Over-charging/Over- discharging Protect Voltage	Battery over-charging/over-discharging protection voltage threshold.
Data Save Interval	The interval time for automatic data storage.

2) After setting the parameters, click **Confirm** to save the current settings and return to the balance interface. Click **Start** on the balance interface to start balancing.

Module NO.: #1 Target Vol(V): 3.1 n(mV): 1	Cell Type: Max Voltage (V): Balancing Time:	3.799 Min Voltage (V	
Channel	Balancing	Channel 2	Not Connected
Highest Voltage(V)	3.799 B02	Highest Voltage(V)	0.000 -
Lowest Voltage(V)	3.798 B01	Lowest Voltage(V)	0.000 -
Cell Voltage Deviation(mV)	1	Cell Voltage Deviation(mV)	0
Cells Connected	2	Cells Connected	0
Max Temperature (℃)	21.1	Max Temperature (°C)	-
Min Temperature (°C)	20.7	Min Temperature (°C)	-

3) During the balancing process, you can check the test progress and wait for the test results. Click **Stop** to end the current balancing process.

Module NO.: #1 Target Vol(V): 3.1 ation(mV): 1	Cell Type: Max Voltage (V): Balancing Time:	3.799 Min Voltage (V):	1. 1 .
Channel	1 Standby	Channel 2	Standby
Highest Voltage(V)	3.799 B02	Highest Voltage(V)	0.000 -
Lowest Voltage(V)	3.798 B01	Lowest Voltage(V)	0.000 -
Cell Voltage Deviation(mV)	1	Cell Voltage Deviation(mV)	0
Cells Connected	2	Cells Connected	0
Max Temperature (°C)	21.2	Max Temperature (°C)	-
Min Temperature (°C)	20.6	Min Temperature (℃)	-
		Settings Details	Start

4) Click **Details** to view the specific data of the tested battery, including balancing time, cell voltage, cell balancing current, charge and discharge capacity, and temperature of each temperature monitoring point.

EB240 User Manual

00:00:21			Vol	tage	9	Temp	erature				÷
	Cha	nnel 1					Cha	nnel 2	2		
	V	l.	А		Ah		V	Ĩ	А	1	Ah
😫 B1	3.798	3	3.649		-0.008	🛍 B1			-		-
😫 B2	3.799	3	3.651		-0.008	😫 B2			σ		σ
😫 B3	-		-		10	😫 B3	-		-		-
😫 B4	-		-		(m)	😫 B4	-		-		-
😫 B5	2		121		12	🛤 B5			2		2
🛤 B6	-		100		871	😫 B6	-		σ		-
🛤 B7	-		-		-	😫 B7	~		-		-
🛤 B8	-		() and		(w)	😫 B8	-		-		-
😫 B9	2		-		-	😫 B9			2		2
😫 B10			-		87	🛤 B10	-		8		ā
😫 B11	-		1.00		1.00	🛍 B11	-		-		-
B 12			-		-	B 12	-		-		-

4.3.3 Record

1) Click on **Record** in the left function menu to enter the record interface.

SmartSa	fe		Battery Cell Equalizer			
5	Plea	se enter Module	NO.,Time, or CellType to	search		Search
Balancing	No.	Module NO.	Time	Cell Type	Operat	ion
-	1	#1	December 16, 2024 08:33:45	NCM	Details	Delete
Record	2	#1	December 16, 2024 08:30:29	NCM	Details	Delete
	3	test	December 16, 2024 01:52:04	NCM	Details	Delete
	4	gh	December 14, 2024 07:47:04	NCM	Details	Delete
Update	5	rrty	December 13, 2024 07:28:47	LFP	Details	Delete
	6	rrty	December 13, 2024 07:10:21	NCM	Details	Delete
	7	rrty	December 13, 2024 07:09:21	NCM	Details	Delete
Settings	8	rrty	December 13, 2024 07:08:43	NCM	Details	Delete
	Total 115	Records	First Page Previous	Page Ne	xt Page	Last Page

- 2) Click the **Delete** button on the right side of an individual record or click the **Delete** button on the record details page to remove the record from the list.
- 3) Click the **Detail** button on the right side of an individual record to view the record details. *Note: By entering keywords in the top search bar, you can quickly find the corresponding record.*

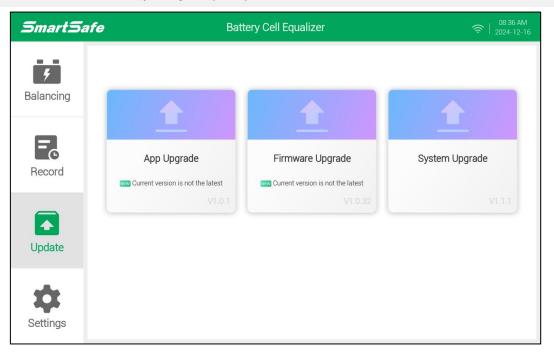
Module Information						
Module N0 : Number of Cells; Target Vol(V): Initial Balancing Current; Initial Deviation of Cell Voltage: Nominal Capacity;	2 Balancing Time: 00::00::34 3.1V Lowest Limited Voltage: 3.0V 5.0A Terminate Current: 0.05A 1mV Ended Deviation of Cell Voltage: 1mV		00 : 00 : 34 3.0V 0.05A 1mV			
Overall Balancing Results						
Cell Type:	Before Balancing	After Bal	ancing			
Highest Cell Voltage (V)	3.799(PA2)	3.799(PA	2)			
Lowest Cell Voltage (V)	3.798(PA1)	3.798(PA	1)			
Deviation of Cell Voltage (mV)	1	1				
Highest Temperature (°C)	21.1	21.0				
Lowoot Tomporatura (m)	01.1	21 0				
Delete	Print Expor	t PDF Export Excel	Back			

- 4) On the individual record details page, click the **Print** button to print the record.
- 5) Insert the USB memory stick, click the **Export PDF** or **Export Excel** button on the individual record details page, and you can export the record to the USB memory stick.

4.3.4 Update

Click **Update** in the function menu on the left to enter the software Update interface. Select options such as **APP Upgrade**, **Firmware Upgrade** or **System Upgrade** to view the current version and the latest version, and click **Update Now** to upgrade the APP, firmware or system to the latest version.

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



	App Upgrade	
Current Version		V1.0.1
New Version		V1.0.2
Update Log Not Yet Available		
		Back Update Now

4.3.5 Settings

Click **Settings** in the function menu on the left to enter the system settings interface. The system settings include **WLAN**, **Language**, **Date and Time**, **Expert Mode**, **Developer Mode**, **Device Self Check** and **About**.

SmartSa	afe	Battery Cell Equalizer	
	🛜 WLAN		CF-2.4-5F >
F Balancing	📵 Language		English >
	Date And Time		>
=	Expert Mode		
Record	Developer Mode		>
	Device self check		>
	i About		>
Update			
Settings			

WLAN: Used to set up the device's wireless network connection.

	WLAN
Connected	
CF-2.4-5F	چ چ
Available	
ikuai_3417	ି
SUP	<u>چ</u>
YGW	Ś
ChinaNet-EYYG	Ś
Chinaklat kist	<u></u>
	Back

Language: Used to set the system language.

	Language	
English		~
中文简体		
		Back

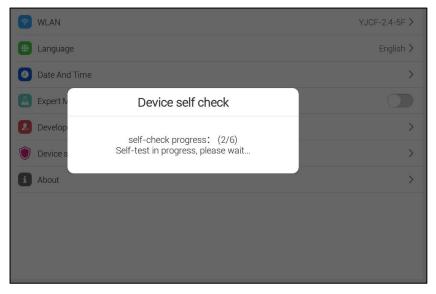
Date and time: Used to set date, time and time zone, etc.

Date	And Time
24-Hour Format	
Auto Set	
Date	2024-10-23 >
Time	08:05 >
Time Zone	GMT >
	Back

Expert mode: Used to switch the parameter setting mode of charging and discharging to Expert mode.

Developer Mode: This function is only for development and maintenance, a password is required.

Device seft-test: Support automatic self-check of device.



About: Used to view information such as Device Model, APP Version, Firmware Version, System Version and Device Serial Number.

About	
Device Model	EB240
APP Version	V1.0.1
Firmware Version	V1.0.32
System Version	V1.1.1
Device Serial Number	806024900005
	Back

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.