

# User Manual for 30A/60A/100A DC to DC Charger

## 1. Product Overview

This product is a 4-switch synchronous rectification BUCK/BOOST automatic step-up/step-down DC/DC conversion controller. It operates in both BUCK (step-down) and BOOST (step-up) modes, seamlessly and noiselessly transitioning between modes, allowing conversion of input voltages higher, lower, or equal to the output voltage. Using a current-mode control design with adjustable input and output, and high-side current sensing for ground-sharing applications, it is an ideal choice for automotive, industrial, telecommunication, and battery-powered applications.

### BUCK (Step-Down) Mode Features:

- Maximum Output Power: 450W/900W/1500W
- Input Current Adjustment: 0~60Adc  $\pm 3\%$
- Output Current Adjustment: 0~60Adc  $\pm 3\%$
- Voltage Step-Down Ratio: 2~25 times ( $V_{IN} \div V_{OUT}$ )
- Maximum Efficiency: 98%

### BOOST (Step-Up) Mode Features:

- Maximum Output Power: 375W/750W/1250W
- Input Current Adjustment: 0~60Adc  $\pm 3\%$
- Output Current Adjustment: 0~50Adc  $\pm 3\%$
- Voltage Step-Up Ratio: 2~5 times ( $V_{OUT} \div V_{IN}$ ) — **For a step-up ratio of 3~5 times, the rated output power must be reduced, meaning the output current should be lowered accordingly.**
- Maximum Efficiency: 95%

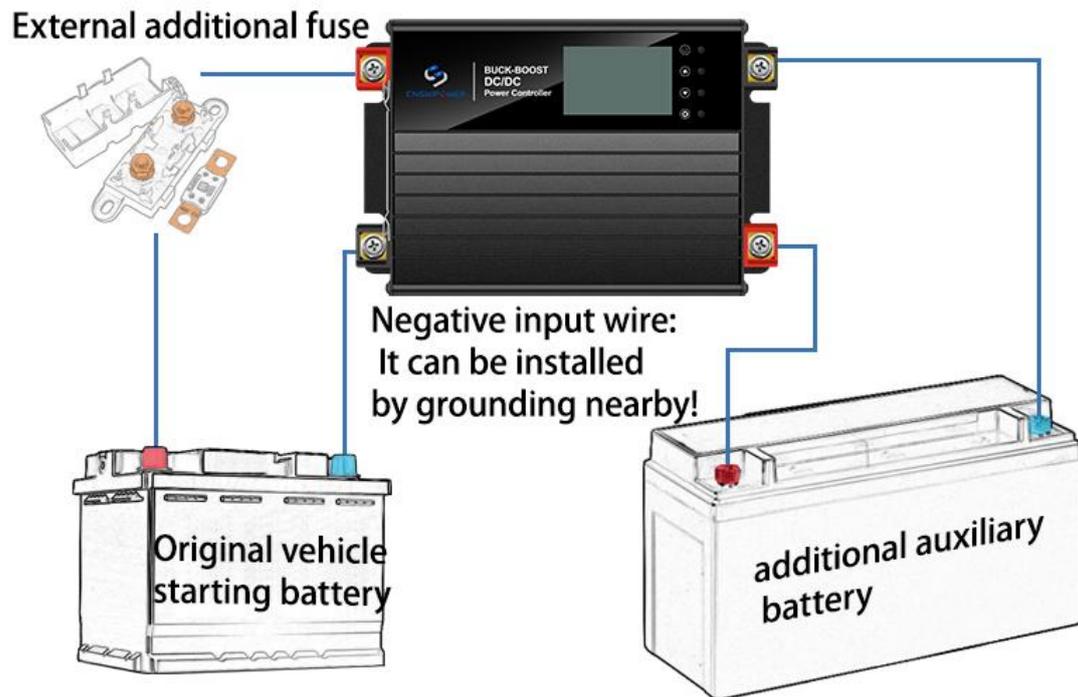
### General Features:

- Input Voltage Range: 9~50VDC  $\pm 1\%$
- Output Voltage Adjustment: 2~50VDC  $\pm 1\%$
- Under-Voltage Protection Adjustment: 0~50VDC  $\pm 1\%$
- Over-Voltage Protection Adjustment: 0~50VDC  $\pm 1\%$
- Solar Voltage Tracking Adjustment: 0~50VDC  $\pm 1\%$

- Startup Delay Time: 5~999 seconds
- Temperature Control Protection: Fan activates at 45°C and turns off at  $\leq 40^{\circ}\text{C}$ ; Shutdown at 90°C, restart at  $\leq 60^{\circ}\text{C}$
- Operating Temperature:  $-30\sim 85^{\circ}\text{C}$
- Storage Temperature:  $-40\sim 105^{\circ}\text{C}$

(Table 1-1)

## 2. Wiring Diagram



## Special statement:



1. It is strictly prohibited to connect the positive pole and the negative pole reversely. Otherwise, the device will be scrapped, and no return or exchange will be provided.
2. After connecting a battery to the output terminal, it is prohibited to adjust the output voltage. Any consequences arising therefrom shall be borne by the user.
3. Please select the corresponding wire according to the magnitude of the current, and put on a fireproof sleeve.

Especially  
the experienced  
veteran technicians!! !

## 3. Quick Installation Guide

① Check the input and output terminals carefully to avoid incorrect connections. First, connect the positive terminal of the main battery to the input terminal, followed by connecting the negative terminal to the input terminal, which can be grounded. **(Warning: Reversing the polarity will cause immediate and irreversible damage!)**

② Ensure the main battery voltage is above 12V for proper startup (if too low, start the vehicle first).

③ Startup delay countdown (default: 60 seconds) will appear on the screen.

④ After 5 seconds on the main screen, output voltage will be displayed.

⑤ Adjust output voltage settings:

Hold the "SET" button for 3 seconds to enter the settings menu.

Set desired output voltage according to the auxiliary battery type (refer to Table 6-1, 6-2, or 6-3).

Set startup voltage and shutdown voltage accordingly.

If using a 12V main battery, the default shutdown voltage is 12V, and the default startup voltage is 13V. If using a 24V main battery, set the shutdown voltage to 24V and the startup voltage to 26V.

If additional parameters need adjustment, refer to Section 4: Display & Button Operations for further details.

Confirm settings and return to the main screen. Wait for the output voltage to stabilize. **(You need to wait for several seconds or tens of seconds.)**

⑥ Remember to make sure that the output voltage of the main interface is equal to the output voltage set in the setting interface in step ⑤ before you can start connecting the auxiliary battery, connect the output positive pole to the output terminal, and finally connect the

output negative pole to the output terminal. The negative pole can be grounded; **(If the positive and negative poles are connected in reverse once, it will be directly scrapped and has no repair value!!!)**

⑦ The display shows the output current, which means it is in normal working state (Remember! After connecting the auxiliary battery, do not set the output voltage. If you want to set a new output voltage, you need to disconnect the positive and negative poles of the auxiliary battery from the output end of the device and set it according to step ⑤).

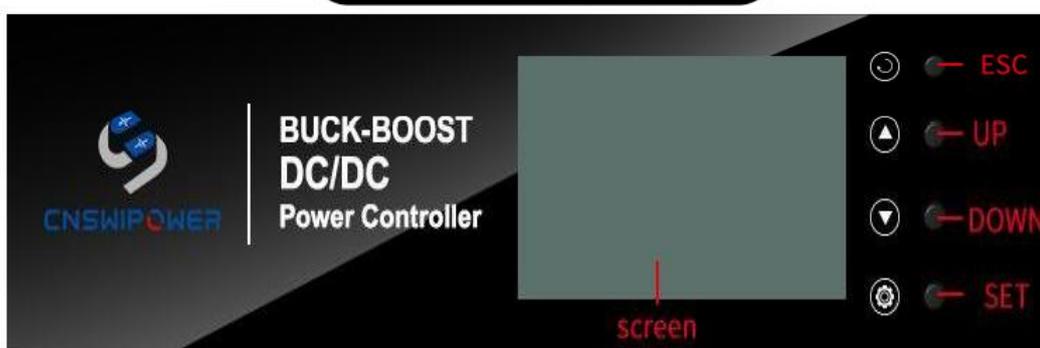
### Special Statement:

- ■ Reversing the positive and negative terminals even once will result in immediate damage beyond repair!
- ■ When the output is connected to a battery or a capacitive load such as a supercapacitor, adjusting the output voltage is strictly prohibited!
- ■ The negative terminal can be connected to ground, but it is still recommended to connect both negative terminals to ground simultaneously! If the output current is limited and cannot be adjusted to the maximum, try swapping the input and output negative terminals or connecting both negative terminals to the input side.
- ■ For all circuits exceeding 40V, whether on the input or output side, a switch or quick-connect plug must be installed. Always disconnect the power before making connections!

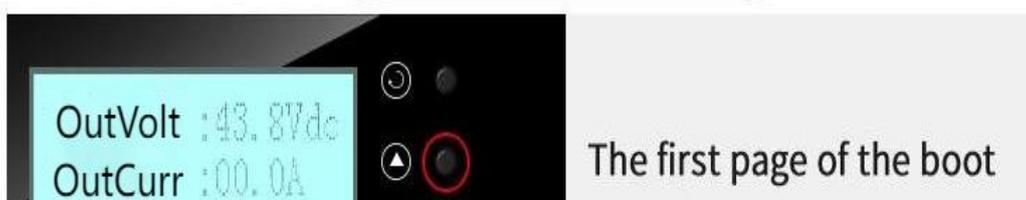
## 4. Display Interface and Button Operation

### Instruction

In the screen-off state

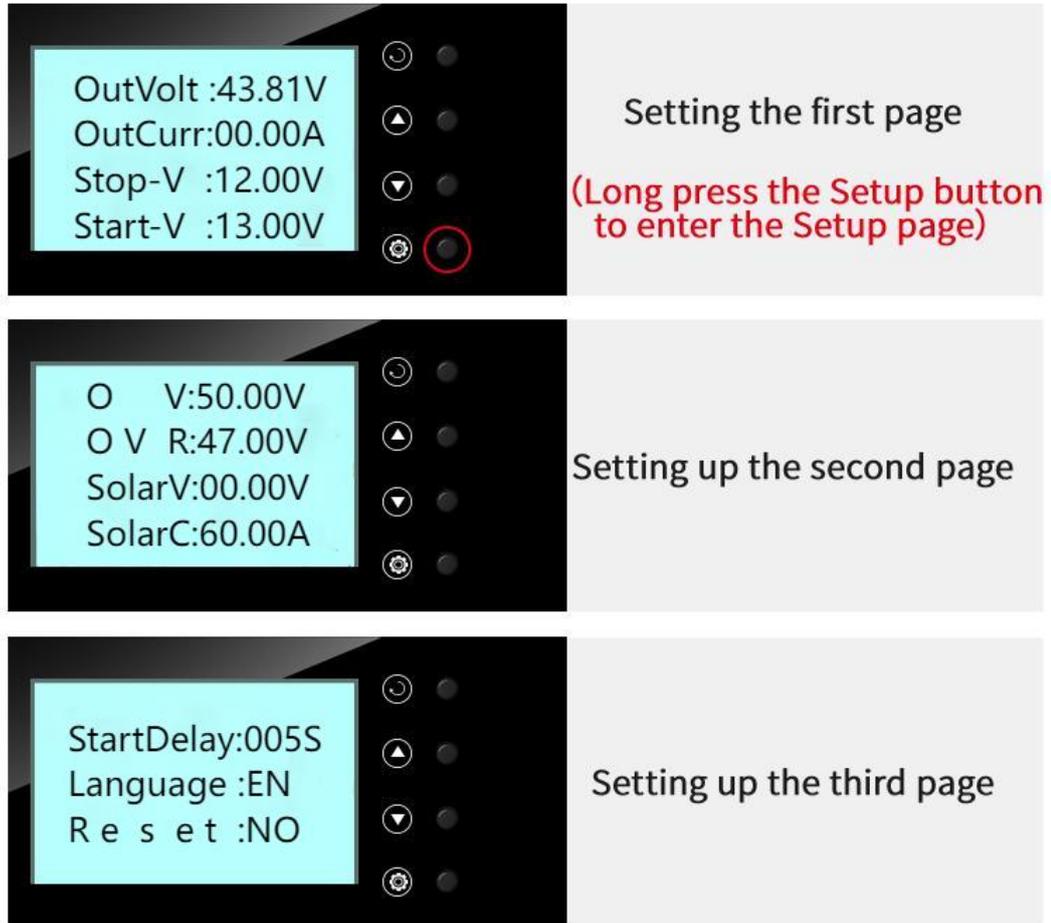


In the power-on state





## Setting state



■ The display section uses a monochrome LCD screen as the human-machine interaction interface, displaying real-time data such as the current output voltage, output current, input voltage, startup delay time, internal temperature, and fault status.

Users can configure parameters such as output voltage, maximum current, shutdown voltage, startup voltage, overvoltage protection, overvoltage recovery, solar voltage, solar current, startup delay, language, and factory reset. Additionally, the current device version can be viewed.

If no buttons are pressed, the display backlight will automatically turn off after 15 seconds. Pressing any button will restore the backlight.

■ Button Functions:

From top to bottom, the buttons are:

Return Button

Up Button

Down Button

Settings (Confirm) Button

All buttons support long-press adjustment. When modifying settings, pressing and holding the Up or Down button for 1 second enables rapid increment or decrement.

### → Startup Delay Page

- When the device is powered on, it defaults to the startup delay page. If the countdown is less than 5 seconds, it will automatically enter the main page.
- Pressing and holding the **Settings** button for 3 seconds will force entry into the main page, and the startup countdown will continue running in the background.

### → Startup Delay Countdown Remaining 5 Seconds Page

- When 5 seconds remain in the countdown, the device will enter the main page early.
- During these 5 seconds, the displayed input voltage represents the no-load input voltage. After the countdown ends, the displayed input voltage will be the loaded input voltage.
- By comparing these two input voltage values, users can set appropriate shutdown and startup voltages.

#### **Example:**

If the main battery has a slightly inflated voltage or a relatively small capacity, while the auxiliary battery has a larger capacity, the no-load voltage of the main battery may be **13V**, but under load, it may drop to **11V**. In this case, the device may continuously cycle between startup and shutdown. To prevent this, the startup voltage should be set to **13.5V**, ensuring stable operation.

#### **Default settings:**

- **Startup voltage:** 13V
- **Shutdown voltage:** 12V

### → Main Page

- Displays real-time data. Pressing the **Up** or **Down** button briefly allows page flipping.
- Pressing and holding the **Settings** button for 3 seconds enters the **Settings Page**.
- Pressing and holding the **Return** button for 3 seconds enters the **Version Information Page**.
- **For vehicle charging applications**, the input voltage should be higher than **12.5V**; otherwise, reduce the output current.
- **For solar charging applications**, the input voltage should be close to the **maximum power point voltage (Vmp) of the solar panel**.

### → Settings Page

■ This page is used to configure data parameters. After entering this page, press the **Up** or **Down** button briefly to select the desired setting.

Once the cursor moves to the desired setting, press the **Confirm** button briefly to make the data field background turn black. At this point, use the **Up** or **Down** button to adjust the target value.

If a data field is selected, pressing the **Return** button will cancel the adjustment and restore the previous saved value (except for output voltage and output current).

After setting the target value, press the **Confirm** button briefly to save the data automatically.

■ When no data field is selected, pressing the **Return** button will return to the **Data Display Page**.

■ **All modified parameters must be saved by pressing the Confirm button to take effect.** The memory save process takes a few seconds. If the input power is disconnected during this process, any custom modifications will be lost.

#### ■ **Output Voltage Settings:**

- The output voltage **must** be adjusted **before connecting a load (such as an auxiliary battery)**. First, adjust the voltage with no load connected.
- After setting the output voltage, return to the **Main Page** and wait until the output voltage matches the set voltage. This may take several seconds or even up to a minute.
- **Important:** Ensure that the output voltage is exactly the same as the set voltage before connecting the auxiliary battery.

⚠ **Warning:** When a battery or other capacitive load is connected to the output terminal, adjusting the output voltage is strictly prohibited!

#### ■ **About Maximum Current Settings:**

Generally, there is no need to modify the maximum current, as the system defaults to the highest charging current.

For example, a 60A machine. The device has a **maximum output power limit:**

- **Boost mode:** Maximum power is **750W**
- **Buck mode:** Maximum power is **900W**
- **Maximum input and output current:** **60A**

Based on this, the following conclusions can be made:

- ① **For a 12V auxiliary battery,** the ideal maximum charging current can reach **60A**.

- ② For a **24V auxiliary battery**, the ideal maximum charging current can reach **30A**.
- ③ For a **48V auxiliary battery**, the ideal maximum charging current can reach **15A**.

Machines rated at 30A and 100A follow the same pattern—their maximum input and output currents are 30A and 100A, respectively.

#### ■ About Shutdown Voltage Settings:

(If used for vehicle charging, when the main battery voltage drops below the set shutdown voltage, charging to the auxiliary battery will stop. At the same time, the device will enter **low-power mode**, and the screen will turn off.)

If the **input voltage remains below the shutdown voltage for 3 seconds**, the device will automatically shut down.

#### ■ About Startup Voltage Settings:

The startup voltage determines when the device will automatically power on and resume operation after entering low-power sleep mode, once the input voltage exceeds the set startup voltage.

(If used for vehicle charging, the main battery voltage must reach the set startup voltage before charging the auxiliary battery will begin.)

#### ■ About Overvoltage and Recovery Voltage Settings:

- If the **input voltage exceeds the overvoltage setting**, the device will automatically stop outputting. The current fault status can be viewed on the **Main Page**.
- **Overvoltage recovery** determines when the device resumes operation after an overvoltage protection event. Once the **input voltage drops below the recovery voltage**, the overvoltage fault is cleared, and output automatically resumes.

⚠ **Important:** Exceeding the device's **rated maximum voltage** can still result in **permanent damage**.

#### System Restrictions:

- **Shutdown voltage cannot be higher than startup voltage** under normal operation.
- **Overvoltage setting cannot be higher than overvoltage recovery**.
- If an **unconventional** setting is attempted, the system will **automatically restrict** values to prevent potential risks.

#### ■ About Solar Voltage Settings:

This setting is used to adjust **MPPT (Maximum Power Point Tracking)** and is applicable **only for solar panel charging**. For other applications, it **must be set to the minimum value of 0.0V**.

**How to Set:**

Check the **solar panel's specification label**—the **Vmp (Maximum Power Point Voltage)** is the value that should be set as the **solar voltage** on the device.

■ **About Solar Current Settings:**

This is for **special applications** and is **not recommended to be adjusted**. It should be set to the **maximum value**; otherwise, it will **limit the overall output power** of the device.

If the **load on the output side can only handle a small current**, you may first **calculate the voltage, current, and power**, then preset this input current accordingly.

■ **About Startup Delay Settings:**

This setting adjusts the **power-on startup delay time**, with a configurable range of **5 to 999 seconds**.

■ **About Language Settings:**

Supports switching between **Chinese and English**.

■ **About Factory Reset:**

Selecting "**Yes**" and pressing the **Confirm** button will reset all data to factory settings. The system will automatically return to the **Main Page**, and once the **startup delay changes to 60 seconds**, the factory reset is complete.

→ **Version Information Page**

- View the current device version number.

→ **Low Power Mode Entry Page**

- After startup, if the **input voltage drops below the shutdown voltage**, the system will automatically enter **sleep (low-power) mode**.
- In **low-power mode**, the display screen will turn off completely. Normally, the **input voltage must reach the startup voltage** for the system to power on again.
- Alternatively, **press and hold the Settings button for 3 seconds** to manually wake up the device.
- If the device remains in an **undervoltage state for 5 minutes after waking up**, it will automatically re-enter **low-power mode**.

## 5. Selection of Connecting Cables

| Cable Types and Specifications                       | Aging Test for Current Carrying Capacity  |
|--|---|
| 12AWG Silicone Wire and BV/BVR 4mm <sup>2</sup> Wire | Suitable for applications below 25A.      |
| 10AWG Silicone Wire and BV/BVR 8mm <sup>2</sup> Wire | Suitable for applications below 20-35A.   |
| 8AWG Silicone Wire and BV/BVR 12mm <sup>2</sup> Wire | Suitable for applications below 30-50A.   |
| 6AWG Silicone Wire and BV/BVR 16mm <sup>2</sup> Wire | Suitable for applications below 60-100A.  |
| 4AWG Silicone Wire and BV/BVR 25mm <sup>2</sup> Wire | Suitable for applications below 100-160A. |

**There may be discrepancies between the actual AWG and the specified AWG. Please contact**

the wire supplier directly for confirmation!

Friendly Reminder:

The **output current is not equal to the input current**. Use the formula:

$$\text{Current} = \text{Power} \div \text{Voltage}$$

to calculate, and ensure that the **input power is at least 10% greater than the output power** to account for energy loss.

Example Calculation:

Given:

- Output voltage = **29.2V**
- Output current = **20A**
- Output power =  $29.2V \times 20A = 584W$

If input voltage = **13V**:

- Input current =  $(584W \times 1.1) \div 13V = 49.4A$

If input voltage = **12V**:

- Input current =  $(584W \times 1.1) \div 12V = 53.5A$

Additionally, after the device starts operating, the **input voltage may drop** due to load impact, causing the **input current to increase**. This effect is particularly noticeable in **battery-to-battery charging applications**.

Thus, a **higher input current budget should be considered**, though it is not unlimited. The device has a **preset maximum input current limit**—please refer to the **specific product specifications** for details.

## 6. Output Voltage Adjustment Parameters

| Lead-Acid Battery Pack Voltage Parameters |       |       |       |       |     |       |
|---|-------|-------|-------|-------|-----|-------|
| Battery Cell Series Configuration         | 1S    | 2S    | 3S    | 4S    | 5S  | 6S    |
| Nominal Voltage                           | 12V   | 24V   | 36V   | 48V   | 60V | 72V   |
| Charging Voltage                          | 14.6V | 29.2V | 43.8V | 58.4V | 73V | 87.6V |

(Table 6-1)

| Phosphate Lithium (LiFePO4) Battery Pack Voltage Parameters |     |      |      |      |      |      |      |      |      |      |      |
|---|-----|------|------|------|------|------|------|------|------|------|------|
| 1S  | 2S  | 4S   | 6S   | 7S   | 8S   | 10S  | 11S  | 12S  | 14S  | 15S  | 16S  |
| 3.2   | 6.4 | 12.8 | 19.2 | 22.4 | 25.6 | 32   | 35.2 | 38.4 | 44.8 | 48   | 51.2 |
| 3.65  | 7.3 | 14.6 | 21.9 | 25.6 | 29.2 | 36.5 | 40.2 | 43.8 | 51.1 | 54.8 | 58.4 |

(Table 6-2)

| Polymer Lithium Nickel Cobalt Manganese (NCM) Battery Pack Voltage Parameters |    |    |    |    |    |    |    |    |     |     |     |
|---|----|----|----|----|----|----|----|----|-----|-----|-----|
| 1S  | 2S | 3S | 4S | 5S | 6S | 7S | 8S | 9S | 10S | 11S | 12S |

|     |     |      |      |      |      |      |      |      |    |      |      |
|-----|-----|------|------|------|------|------|------|------|----|------|------|
| 3.7 | 7.4 | 11.1 | 14.8 | 18.5 | 22.2 | 25.9 | 29.6 | 33.3 | 37 | 40.7 | 44.4 |
| 4.2 | 8.4 | 12.6 | 16.8 | 21   | 25.2 | 29.4 | 33.6 | 37.8 | 42 | 46.2 | 50.4 |

(Table 6-3)

## 7. Maximum Output Current Adjustment Parameters

Before adjusting the **charging current** for the battery pack, please refer to the **charge/discharge rate (C-rate) of the battery cells**. Setting an excessively high charging current may **affect battery lifespan and safety**.

### ① Battery Cell Charging C-Rate

The **C-rate (C)** is calculated using the formula:

**Charging C-rate = Charging Current ÷ Battery Cell Capacity**

**Example:**

A battery cell with a **0.3C charging rate** and a **capacity of 200Ah**

The maximum recommended charging current:

**200Ah × 0.3C = 60A**

### ② Estimating Charging Time

If the **C-rate is unknown**, we recommend the following charging currents:

- **Lead-acid batteries: 0.2C**
- **LiFePO<sub>4</sub> (Lithium Iron Phosphate) cells: 0.3C**
- **Polymer lithium cells: 0.5C**

### ③ Charging Time Calculation

Charging time can be estimated using the formula:

**Charging Time = Battery Capacity ÷ Charging Current**

- **Example:**
  - A **200Ah battery pack** charged at **60A**
  - **Charging Time = 200Ah ÷ 60A = 3.33 hours**

## 8. Special Precautions

① **Reversing the polarity (positive and negative terminals) is strictly prohibited.** Doing so will result in **irreparable damage** to the device, which **will not be covered under warranty, replacement, or repair.**

### ② Do not exceed the voltage or power limits.

- Power = Voltage × Current
- Be aware of the **maximum power limits** for both **boost (BOOST) and buck (BUCK) conversion modes.**

### ③ This device provides constant current output.

- **Do not connect inductive loads directly** (e.g., DC motors, water pumps, inverters, parking

**air conditioners) without a battery at the output side, as this will cause irreparable damage to the device.**

④ **For no-load testing, ensure that the input power source provides at least 2A current, especially when operating at a high boost ratio (Boost Ratio = Output Voltage ÷ Input Voltage).**

⑤ **Do not use a standard adjustable power supply for load testing unless:**

- **The input power source is sufficient**
- **The input power exceeds the output power by at least 1.1 times**

⑥ **Do not use a conventional electronic load tester to measure the power output of this device.**

⑦ **For all circuits exceeding 40V (input or output):**

- **Install a switch or quick-connect plug**
- **Always disconnect power before wiring**

⑧ **This device supports high-end current detection and allows common ground (GND) connections and parallel expansion.**

- **Check all contact points for overheating**
- **Do not connect devices in series to increase voltage**

⑨ **Disassembly is strictly prohibited.**

If the **warranty seal shows "VOID," all after-sales service and warranty claims will be voided.** Please respect industry standards.

⑩ **Install the device in a protected environment that is waterproof, moisture-proof, dust-proof, and insect-proof.**