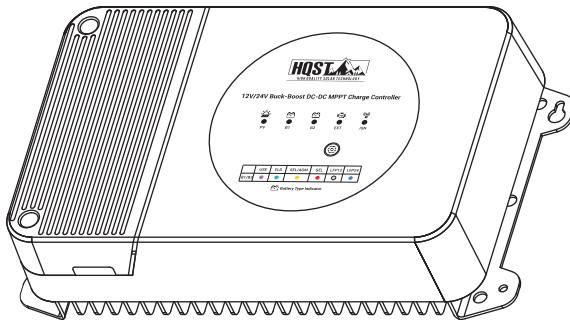




# DC-DC Buck Boost Solar Charge Controller









Model: M2430ND SKU: HCC30DCSR-US



The user manual is meant to offer you a brief walkthrough of the device's features.  
Please save the user manual for future reference.

Still need help? Please contact us via [sales@myhqsolar.com](mailto:sales@myhqsolar.com)

## 1. WARNINGS AND TOOLS ICON CHART

Icons	Name	Description
	High Voltage	High voltage device. Installation should be performed by an electrician.
	High Temperature	This device will produce heat. Mount device away from other items.
	Environmental Hazard	Electronic Equipment. Do not put in landfill.
	Wire Cutter	A wire cutter is needed for cutting and stripping prior wires to connect.
	Multi-meter	A multi-meter is needed for testing equipment and verifying polarity of cables.
	Anti-static Glove	Anti-static gloves are recommended to prevent controller damage caused by static electricity.
	Electrical Tape	Electrical tape is recommended to safely insulate spliced or bare wires.
	Screwdriver	A common size screwdriver is needed to attach wires to the controller.

## 2. SAFETY TIPS

It is crucial to thoroughly review this manual before attempting installation:

- Be cautious of nearby electrical equipment that may interfere during installation.
- Do not connect any AC source to this DC-DC product to prevent fire or device damage.
- Solar panels can produce high voltages and currents; ensure they are covered during installation and consider professional electricians for setup.
- While installing, wear proper insulation to minimize sparks from contact with device wiring.
- Use appropriate fuses to avoid battery or controller damage. For example: For PV+, Nx100W solar input, connect a N\*1.5\*6A fuse. For B1+ and B2+, use a 45A fuse. Contact us for fuse sizing assistance.
- Keep this device out of reach of children.
- Use the correct wire gauge; consult the table below for recommended sizes based on different current loads.

Solar Input Current	5A	10A	20A	30A
Wire Cross Section Area (mm <sup>2</sup> )	1.5	2.5	5	8
Wire AWG	15	13	10	8

\* We recommend a maximum current of 5A for each square millimeter of the wire core. For example, if the current is 10A, it is advised to use at least a 2 mm<sup>2</sup> wire.

## 3. PRODUCT FEATURES

Thank you for choosing our product. It's an innovative 2-in-1 device that combines the functionality of a BUCK-BOOST 12V-24V DC-DC charger and a 12V/24V MPPT solar charge controller. This product operates seamlessly with both alternator and solar power simultaneously, catering to most 12V and 24V battery bank systems.

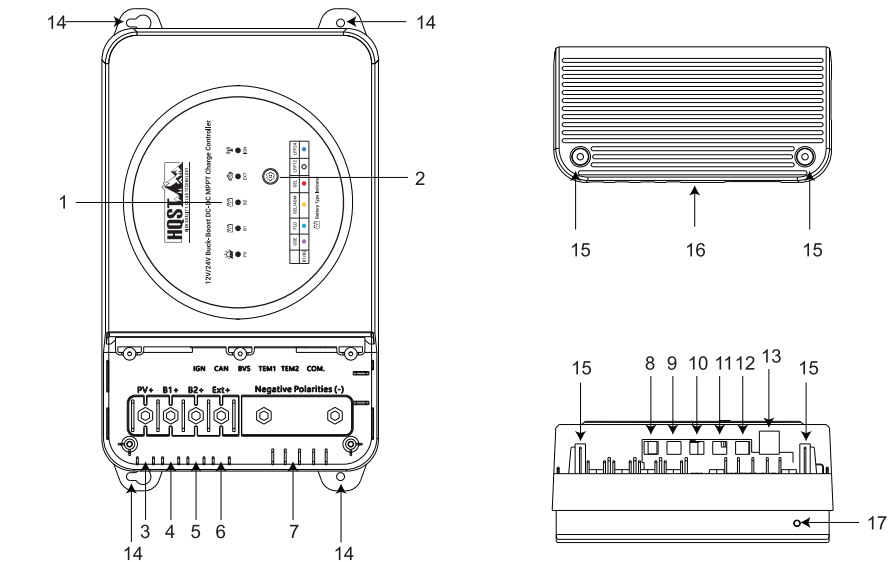
When integrated with solar power in a vehicle, it efficiently charges the starter battery and the main battery independently. The device intelligently allocates charging power based on the alternator and solar power inputs, as well as the status of the two batteries, ensuring optimal charging performance.

Additionally, you have the flexibility to customize the charging mode and parameters using the Bluetooth app.

These DC-DC solar charge controllers have the following features:

- The EXT+ input port can be connected to either an alternator or a DC charger with a voltage of up to 30V. It facilitates BUCK-BOOST charging, supporting both 12V-24V and 24V-12V configurations.
- This product is designed to charge two batteries independently. B1+ defaults to the main battery, and B2+ defaults to the starter battery. For a single battery setup, connect it to either B1+ or B2+.
- It can dynamically adjust charging power for B1+ and B2+ based on PV and EXT+ power:
  1. When the PV+ input power hits the full load capacity of the product (30A), priority is given to the PV+ input over the EXT+ input.
  2. PV+ and EXT+ are used simultaneously when PV+ is below 30A.
  3. Prioritizes charging undercharged B1+ battery.
  4. Switches to charging B2+ after B1+ is fully charged.
  5. By default, a fully charged battery will charge an undercharged battery. However, if the voltage of the B2+ battery drops below 12V (11.7V if IGN is connected), the B2+ battery will cease charging the B1+ battery.
  6. You can customize charging settings through the app, and B2+ charging takes priority in any mode.
- It utilizes the MPPT algorithm, ensuring the most efficient charging method for the battery by continuously monitoring data under different weather and ambient temperature conditions.
- Equipped with a built-in Bluetooth module, this product allows you to conveniently adjust controller parameters and charging modes remotely using a dedicated mobile phone app.
- Supports charging modes for common battery types (AGM, SLD, GEL, Flooded, Lithium) and automatically recognizes 12V/24V battery system voltage.
- The app can log system data for up to 300 days and seamlessly works on both iOS and Android.
- Industrial-grade design with full ranges of electronic protections on PV and battery in the controller.

4. DEVICE DIAGRAM

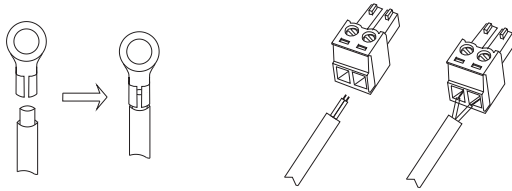


#	Description	#	Description
1	LED Indicator (PV, BAT 1, BAT 2, EXT, IGN)	10	BVS Input Voltage
2	Function Key	11	External BAT 1 Temperature Sensor
3	PV Positive Terminal	12	External BAT 2 Temperature Sensor
4	Battery 1 Positive Terminal	13	RS485 Communication Port
5	Battery 2 Positive Terminal	14	Mouting Holes
6	EXT Input Positive Terminal	15	Junction Box Cover Mounting Screw Hole
7	Common Negative Terminal Port	16	Junction Box Cover
8	IGN Input	17	Shell Ground Connection Point
9	CAN Communication Port		

## 5. MOUNTING INSTRUCTION

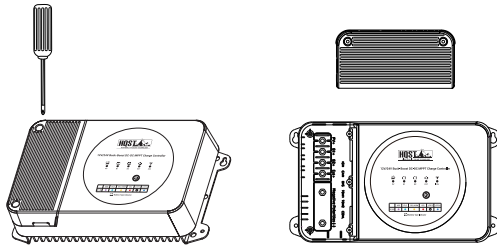
### 5.1 Wire preparation.

Insert the cable into the ring terminal we supply, then use terminal pliers to secure it in place.



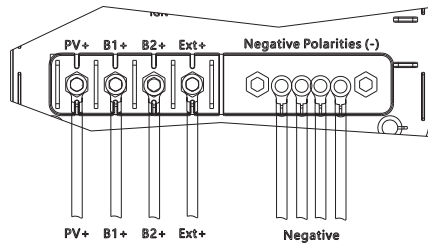
We strongly recommend using the ring terminals supplied by us. Using incorrect terminals may result in poor contact.

### 5.2 Remove the mounting cover plate.

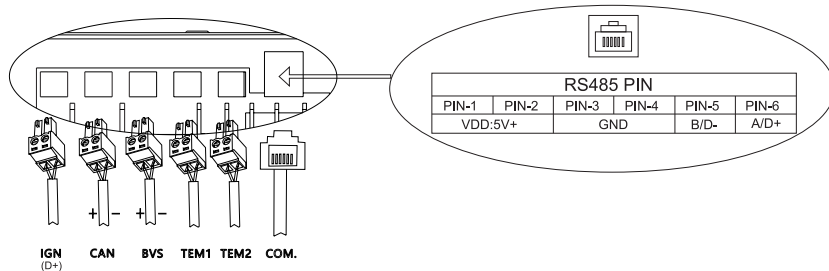


### 5.3 Connect the main wire.

The negative pole of the main wire is the common negative pole, allowing it to be installed in any order.



### 5.4 Connect the communication or the secondary line.

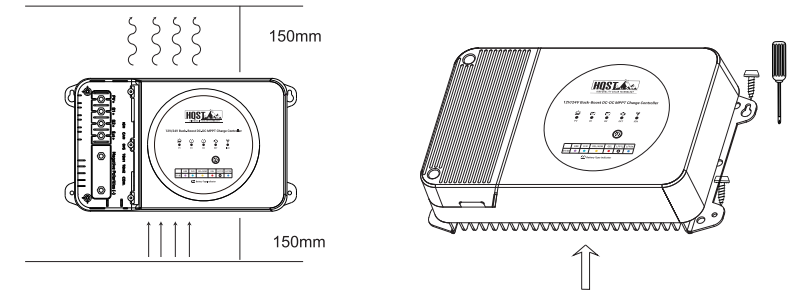


5.5 After connecting the wires, cover the mounting cover plate and tighten the screws.

### 5.6 Fixed.

#### 5.6.1 Placement.

This device employs vertical heat dissipation; therefore, it should be horizontally positioned during installation to ensure smooth dispersion of hot air.



5.6.2 Fixed with self-tapping screws or auxiliary fixing devices.

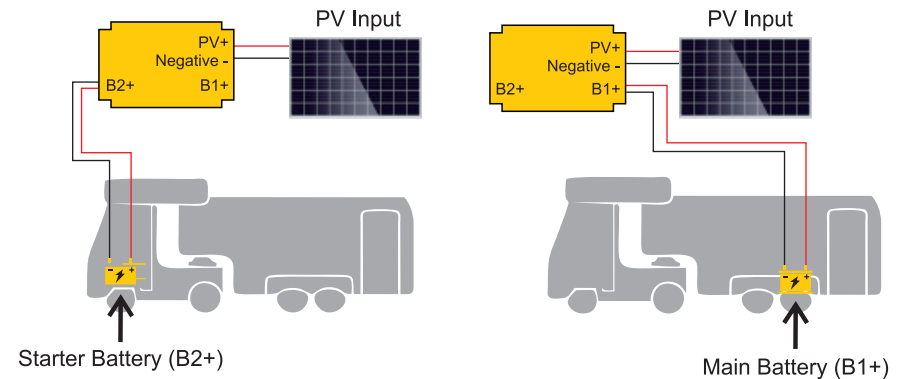
## 6. WIRE CONNECTION SEQUENCES

\* MPPT charging at the PV terminal is buck charging, requiring PV terminal voltage to exceed battery terminal voltage.

\* The EXT terminal operates under Buck-Boost charging, needing input voltage within the 35V maximum range.

### 6.1 Single-battery PV charging system.

The single-battery system allows you to connect either the starter battery (B2+) or the main battery (B1+). The diagram below illustrates only the battery terminal connection. For details on different battery connection scenarios, please refer to the following.

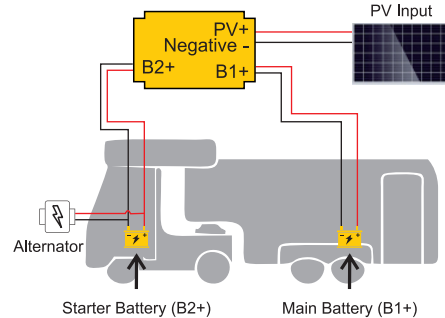




## 6.2 The Alternator directly connected to the starter battery.

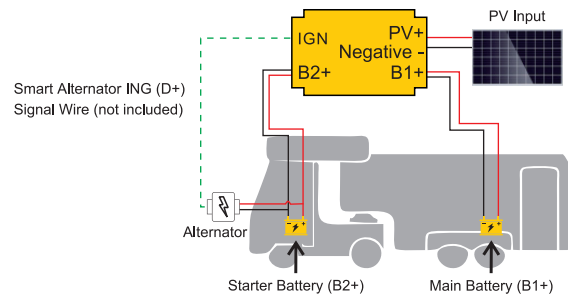
### 6.2.1 Regular Alternator.

The alternator will directly charge the starter battery once the engine is started. When our product senses that the starter battery voltage surpasses 12V, it will automatically initiate the charging of the main battery (B1+) using the starter battery (B2+).

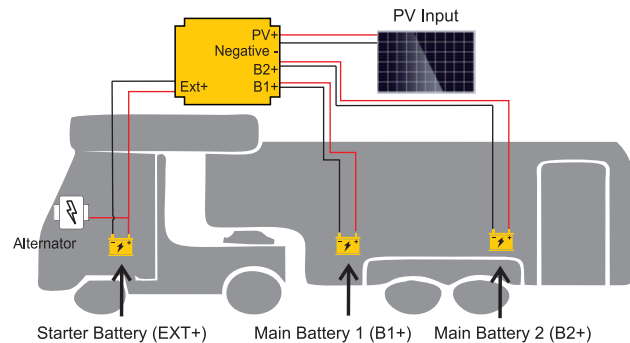


### 6.2.2 Smart Alternator.

The alternator releases the IGN signal line upon starting. When our product is linked to the smart alternator with the IGN cable, it monitors the starter battery's voltage. If the starter battery (B2+) voltage exceeds 11.7V, it initiates charging of the main battery (B1+).



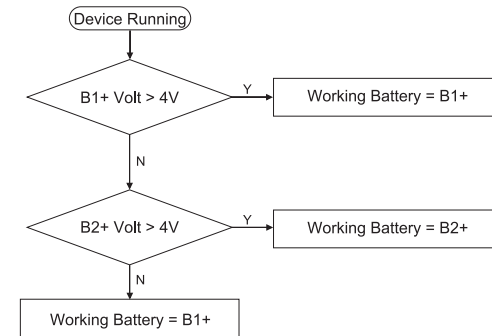
## 6.3 The alternator is connected to the external input port of the controller (This setup is similar to connecting an adapter or power supply directly to the external input port, allowing for DC input only.)



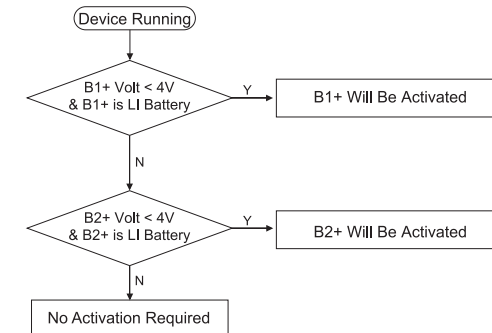
## 7. WORKING PROCESS INTRODUCTION

### 7.1 When the battery power is low, the operational logic determines which battery to prioritize for charging.

In the condition where both the starter battery (B2+) and main battery (B1+) are sealed lead-acid type batteries (AGM, GEL, FLD).

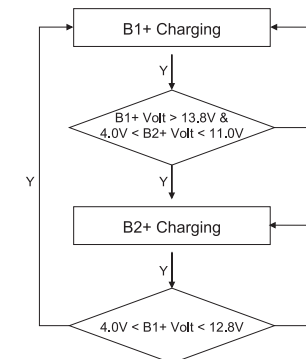


### 7.2 Activate the battery activation function logic (only for lithium batteries)



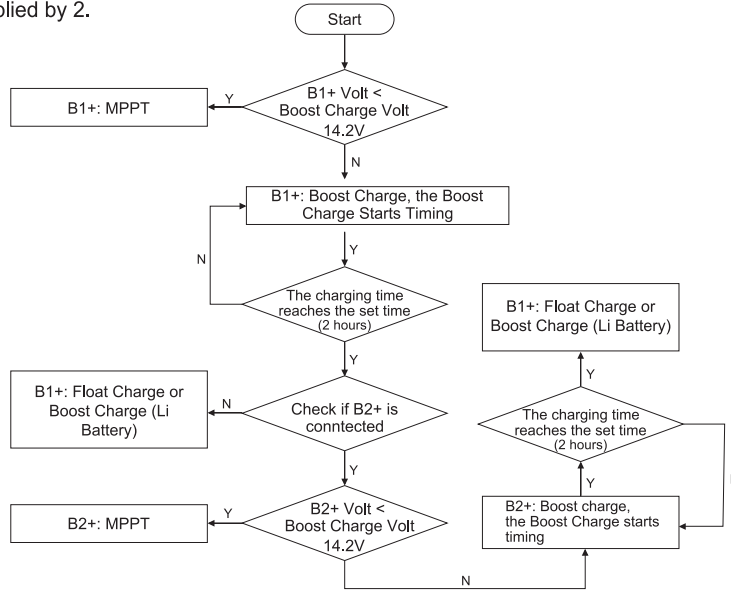
### 7.3 In general, the operational logic determines which battery to prioritize for charging.

For instance, in a 12V battery system. If it's a 24V system, the voltage parameter is multiplied by 2.

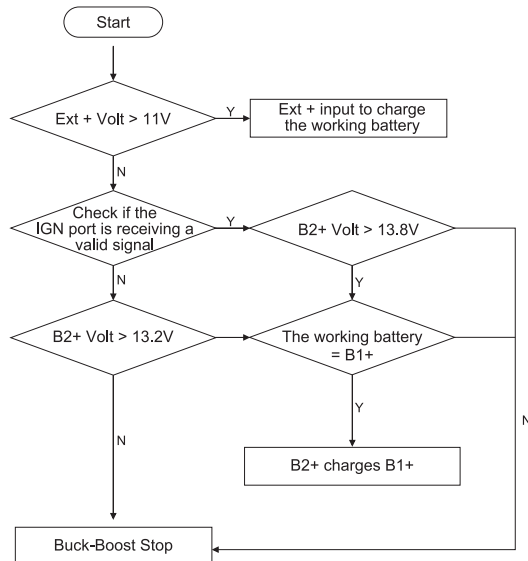


## 7.4 When one of the batteries in the system is fully charged, the operational logic determines which battery to prioritize for charging.

For instance, in a 12V battery system. If it's a 24V system, the voltage parameter is multiplied by 2.



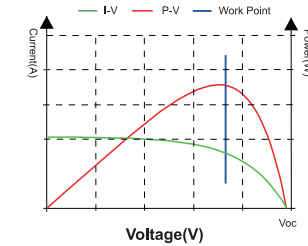
## 7.5 Buck-Boost charging is applied to the working battery, which is the one chosen by the system in the 7.1~7.4 section, using a 12V system as an example.



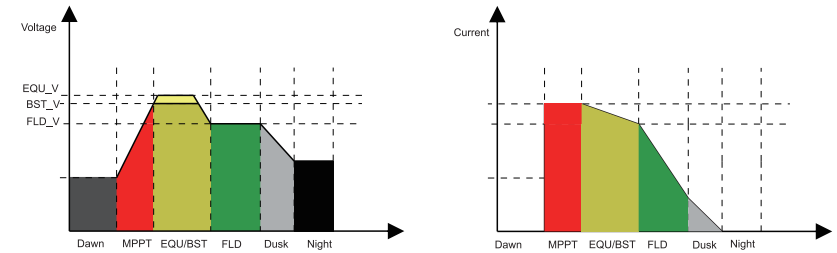
## 7.6 MPPT Charging.

MPPT stands for Maximum Power Point Tracking.

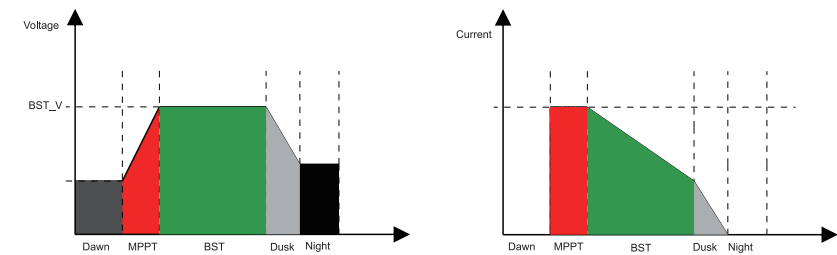
Given the characteristics of the photovoltaic curve, the goal is to track the Work Point for efficient charging when utilizing solar energy.



### 7.6.1 Lead-acid 3-stage Charging.

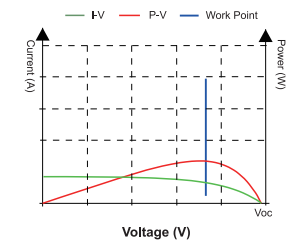
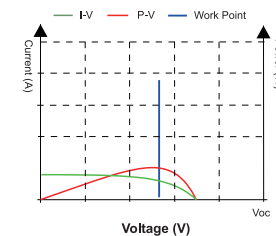


### 7.6.2 LI (LiFePO4) Battery Charging.

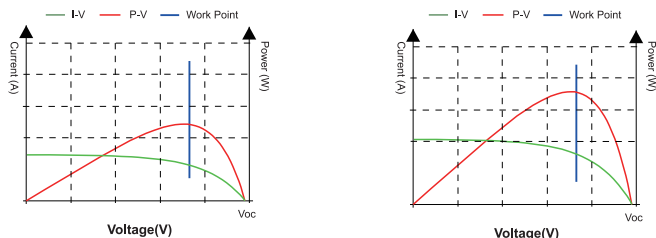


## 7.7 Photovoltaic Characteristics.

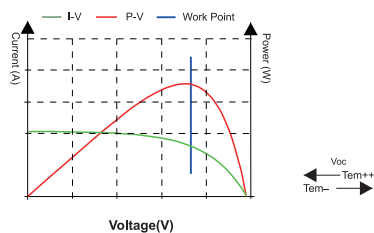
### 7.7.1 PV transitioning from low light (left) to normal light (right) with light enhancement.



**7.7.2 The variation in light intensity is depicted on the photovoltaic curve, ranging from weak light (left) to strong light (right).**



**7.7.3 The impact of temperature on light:** as temperature rises, the open circuit voltage decreases, yet the overall power remains nearly constant.



## 8. LED FLASH RHYTHM CHART



PV



B1



B2



EXT



IGN

LED Name	LED Display	Signal Indication
PV	Off	Solar Input Not Charging * PV LED is generally off during nighttime
	Steady On	Charging Mode
	Slow Flash	Error
B1	Flash	Charging
	Slow Flash	Error
	Steady On	Connection Normal
B2	Flash	Charging
	Slow Flash	Error
	Steady On	Connection Normal

EXT	Off	External Input Not Charging
	Steady On	External Input Detected & DC-DC Charging
IGN	Off	Regular Alternator Not Connected
	Steady On	Regular Alternator Charging

! Check the Fault light for possible system errors.

## 9. KEY + LED BATTERY TYPE OPERATION CHART

### Status Mode:

See the LED FLASH RHYTHM CHART

### View Mode:

B1/B2 - View the current battery type of B1/B2, B1/B2 Slow Flash







### Setting Mode:

B1/B2- The current setting for B1/B2, B1/B2 Fast Flash

### Attached Table 1

Operation Key	Modes	
Short Press 	Current Operation Mode	Enter View Mode
	View Mode	Switch B1 And B2 View Mode (Enter Current Operation Mode after 30s of inactivity)
	Setting Mode	Change B1 Or B2 Type (Exit and save after 30s of inactivity)
Long Press 	Current Operation Mode	Enter B1 Setting Mode
	View Mode	Enter the setting Mode (Long press to enter B1 battery settings mode in B1 battery view mode) (Long press to enter B2 battery settings mode in B2 battery view mode)
	Setting Mode	Exit And Save

Attached Table 2

	USE	FLD	SEL/AGM	GEL	LFP12	LFP24
B1/B2						
	Purple	Cyan	Yellow	Red	White	Blue

## 10. BLUETOOTH APP DOWNLOAD

10.1 Scan the QR code below or search for 'ChargePro 2.0' on the app store to download the app.



ChargePro 2.0



For iOS devices



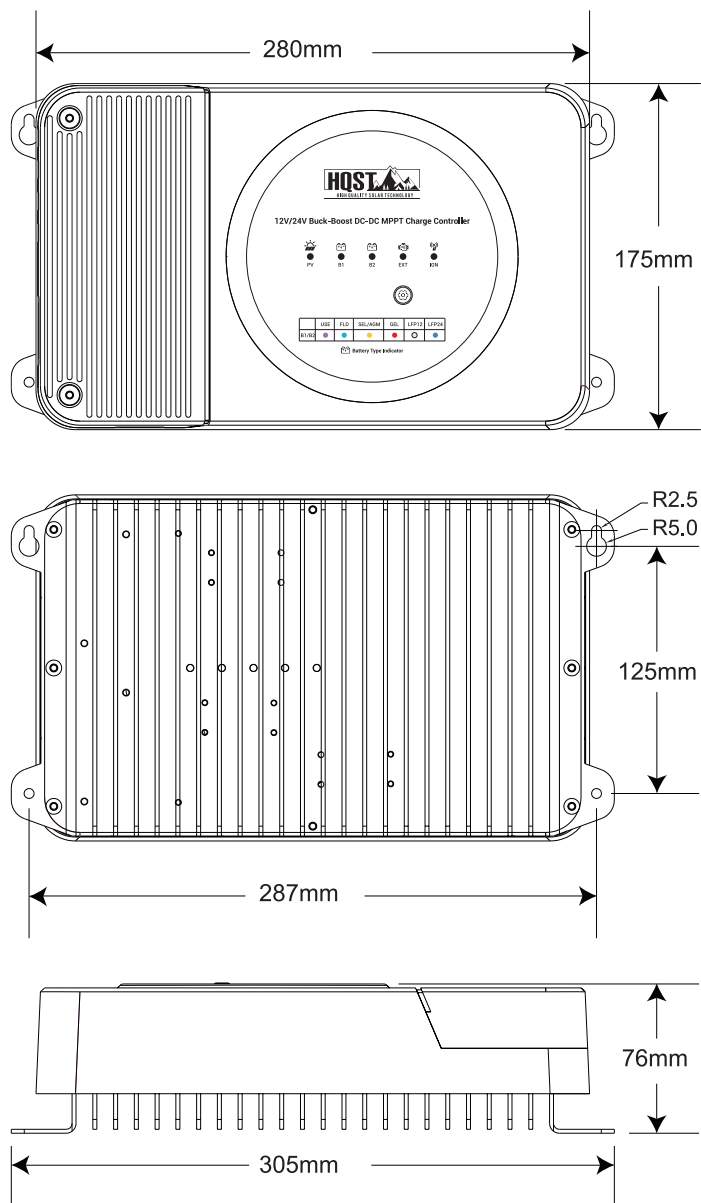
For Android devices

10.2 For detailed instructions on using the app, visit our official product page. Navigate to the Downloads section to access the user guide.

You can directly visit our page at <https://hqsolarpower.com/12v-24v-30a-buck-boost-dc-dc-solar-charge-controller-with-mppt/> or effortlessly scan the QR code below to land on the page.



## 11. PRODUCT DIMENSION



## 12. CONTROLLER SPECIFICATIONS

The variable "N" serves as a multiplier in calculating parameter voltages, with the rule: if the battery system voltage is 12V, N=1; for 24V, N=2.

For instance, the equalize charge voltage for a 12V FLD (Flooded) battery bank is  $14.8V * 1 = 14.8V$ .

For a 24V FLD (Flooded) battery bank, the equalizing charge voltage is  $14.8V * 2 = 29.6V$ .

Charging Mode	MPPT
No-load Loss	25mA
System Wiring Grounded	Negative Grounded
Operating Temperature	-13°F~-113°F (-25°C~45°C)
Storage Temperature	-31°F~149°F (-35°C~65°C)
Operating Altitude	<3000m
IP Protection	IP45
Charging Efficiency	>98% (MPPT)
Communication Port	RS485/CAN(Optional)
Charging Derating	Step derating and recovery at 158°F (70°C)
Connectors	Bare wire terminals (V6) Screws: M4 10mm (with spring washer) Ring terminal: 6mm (internal hole diameter)
Wire Gauge	8mm <sup>2</sup> (8AWG)
Bluetooth	Built-in Bluetooth module, can connect to the app.
Protection	PV Over-Voltage Protection, PV Reverse Protection, Battery Over Voltage Protection, Battery Over-Charge Protection, Battery Reverse Protection, EXT Input Over-Voltage Protection, EXT Reverse Protection, Over-Heating Protection, High Ambient Temperature Protection (149°F/65°C)

Battery 1 (B1+)	
Battery	Main Battery
Battery System Voltage	12/24V AUTO
Battery Voltage Range	8V-32V
Battery Type	GEL/AGM/FLD/SLA (sealed lead-acid)/USE/LI
Max Current	30A
BVS	Yes
Battery 2 (B2+)	
Battery	Starter Battery
Battery System Voltage	12/24V AUTO
Battery Voltage Range	8V-32V
Battery Type	GEL/AGM/FLD/SLA (sealed lead-acid)/USE/LI
Max Current	30A
BVS	No
PV	
Charging Mode	Buck MPPT+CC+CV
Max Solar Input Power	450W / 900W
Max Solar Input Voltage	60Voc
PV Tracking Efficiency	>99%
EXT (External charging equipment)	
Charging Mode	DC-DC Buck-Boost Charging
Equipment Type	DC Alternator, Adapter, Charger, Power Supply, Battery
Max Charging Current	30A
EXT Input Voltage Range	8V-35V
Max EXT Input Power	450W / 900W

## 13. PACKAGE LIST

1 x DC-DC Buck Boost Solar Charge Controller  
 2 x Temperature Sensor Cable (6.6 ft/2 m)  
 6 x M4 10 mm (with spring washer) Screws  
 8 x 6 mm (internal hole diameter) Ring Terminals  
 2 x Double-side Adhesive Sticker (for sticking the temp sensor)  
 1 x User Guide

## 14. WARRANTY

The warranty period for this product is 12 months. We only provide after-sales service for products sold by HQST or retailers and distributors authorized by HQST. If you have purchased your unit through other channels, please contact your seller for more information about the return and warranty.

The warranty will not cover damage caused by:

- Intentional damage
- Natural disasters like earthquakes, fires, etc.
- Improper use or failure to follow instructions.
- Disassembly leading to damage or malfunction.

## 15. SUPPORT INFORMATION

- Need help? Feel free to send us an email at [sales@myhqsolar.com](mailto:sales@myhqsolar.com)
- Visit our website: [hqsolarpower.com](http://hqsolarpower.com)

HQST reserves the right to change the contents of this manual without prior notice



**SCAN ME**

### Customer Support Service

When you encounter any issues, contact our support team through one of the following methods:

- Scan the QR code to submit a support form
- Email us at: [sales@myhqsolar.com](mailto:sales@myhqsolar.com)
- Message the seller directly

Well, we understand you're busy. For faster support, please provide:

- 1 Order number and product serial number\*.
- 2 Please include photos of the product issue, and if possible, a video would be preferred.

\*Product Serial Number:

Usually consists of 13 to 20 alphanumeric characters, printed on a white sticker and attached to the product.

### Activate Your Warranty in Seconds!

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