BougeRV

User Manual

NEGATIVE GROUND
MPPT SOLAR CHARGE CONTROLLER

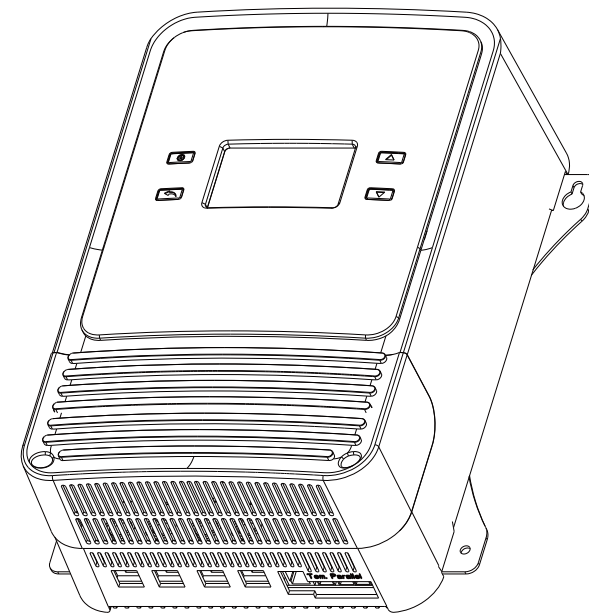# BougeRV
Make the journey

✉ service@bougerv.com

📞 1-408-656-8402

🌐 www.bougerv.com

📞 1-669-232-7427
Whataspp

Contents

1. Safety Instructions

Please follow the safety instructions for operation, the damage caused by not following the safety instructions shall be borne by the individual.

Please save these instructions

1-1.General Safety Information

1.Read all of the instructions and cautions in the manual before installation.
2.There are no repairable parts for this controller,do not disassemble or attempt to repair the controller.
3.Keep the controller from the water.
4.Make sure all connections with controller are tight.
5.Please read the product installation steps to ensure all connections are correct.

1-2.Charge Controller Safety

1.NEVER connect the solar panel array to the controller without a battery. The battery must be connected first.
2.Ensure input voltage does not exceed 150 Voc to prevent permanent damage.
3.Ensure that the output current of the solar panel does not exceed the rated charging current of the controller.

1-3.Battery Safety

1 . Do not let the positive (+) and negative (-) terminals of the battery touch each other.
2. Explosive battery gases may be present while charging. Be certain there is enough ventilation to release the gases.
3. Be careful when working with large lead-acid batteries. Wear goggles and have fresh water available in case there is contact with the battery acid.
4. Over-charging and excessive gas precipitation may damage the battery plates and activate material shedding on them. Too high of an equalizing charge or too long of one may cause damage. Please carefully review the specific requirements of the battery used in the system.

2. Technical After Services

BougeRV provides 1-on-1 Solar Solution.
If you have any questions during use, please feel free to contact us:

✉ **service@bougerv.com**

📞 **1-408-656-8402**

🌐 **www.bougerv.com**

📞 **1-669-232-7427**
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If you could provide the following relevant information to our email **(service@bougerv.com)**; we can provide you with technical support solutions faster.
(1)The connection method of the solar panels (series/parallel, quantity, voltage, power).
(2)The voltage and battery type of the battery.
(3)The pictures or videos of the controller: battery voltage, battery charging current, the output voltage of the solar panel.

3. APP Operating Instructions

1. Scan the QR code on the right to download the application

2. Search for **" ChargePro 2.0 "** in the APP Store (for IOS devices) or Google Play (for Android devices).

Precautions For Using APP

1. The Bluetooth function of the mobile phone is available and turned on.
2. The GPS function is available and turned on in your phone.
3. Android firmware 5.0 and above, or IOS firmware 9.0 and above.

4. Product Features

Dear users, thank you for choosing this product. This product is a negative grounded buck MPPT charging controller. The PV input adopts MPPT digital charging method, and the running status and related parameters can be displayed on the on-board screen or an external screen (optional accessory). It also supports Bluetooth app for online modification and viewing of controller parameters, as well as viewing the current status or history. It is widely used in small-scale power generation and energy storage systems, and has the following remarkable features:

Buck MPPT charging method,negative grounded design, App operation.

· The combination of multiple MPPT algorithms ensures maximum power charging under complex weather conditions.

· Multi-peak detection, to avoid running at low-power peaks when there are multiple peaks.

· When the PV input exceeds the rated power (and less than 1.25 times), the controller maintains the rated power operation (limit operation).

· Three-stage Charging: according to the characteristics of the battery, it has the modes of equalized charging, boost charging, and float charging (lithium batteries only have boost charging).

· It supports Sealed (SEL), GEL, Flooded (FLD), Lithium battery (LI) and User-defined (USE) types of batteries, and it can also be conveniently selected through pressing keys, external screen (optional) and APP.

· Liquid crystal display: through an LCD screen, users can check the system's operating status and set some parameters.

· In the case of non-charging, the controller works in low power consumption mode and consumes less power.

· In non-lithium battery mode, it supports 12V/24V/36V/48V automatic identification, and the lithium battery requires the user to set the system voltage.

· Reverse connection protection: battery polarity reverse protection and PV polarity reverse protection.

· Support RS485 communication mode, adopt Modbus communication protocol (support customer customized protocol and communication media).

· Supports up to 9 machines in parallel, users can expand product capacity by connecting data lines in parallel use.

· Historical data: the system retains 300 days of historical data (charging capacity, maximum charging power, maximum battery voltage, and minimum battery voltage number of days ago).

· Accumulated data: accumulative charging capacity, number of running days.

· Industrial grade design: it can be used in various harsh environments. Over-temperature protection: when the controller is over-temperature, the system will automatically reduce the charging power. If the external environment is over-temperature, the charging will be turned off.

· Over-temperature protection: when the controller is over-temperature, the system will automatically reduce the charging power. If the external environment is over-temperature, the charging will be turned off.

· More comprehensive electronic protection function: battery and solar panel reverse connection protection, over-voltage protection, PV over-voltage protection, etc.

· Support mobile APP monitoring, you can check and modify the controller information (users can download the APP through the IOS or Android system application store).

5. Product Appearance
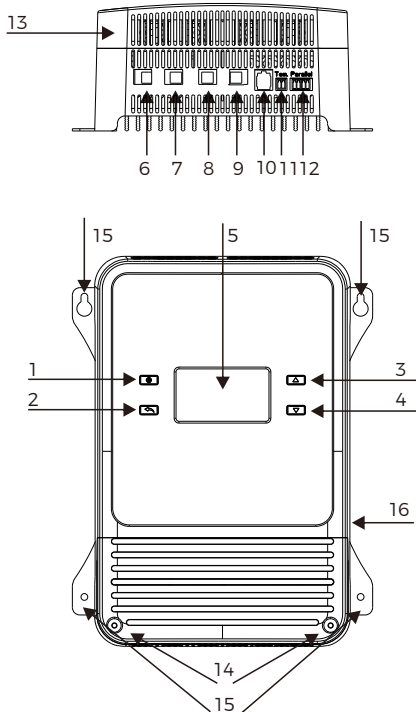
| #	Description
1	Setting
2	Return
3	Plus
4	Minus
5	LCD Screen
6	PV Positive Pole
7	PV Negative Pole
8	BAT Positive Pole
9	BAT Negative Pole
10	RS485 Communication Port
11	External Temperature Port
12	Parallel Wired Port
13	End Cover
14	End Cover Installation Hole
15	Installation Hole
16	Grounded

6. Mounting Instruction
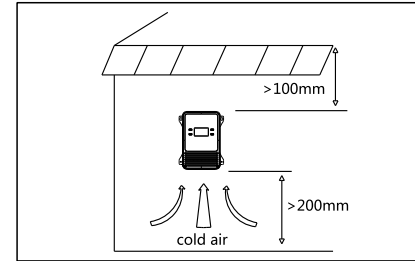
Step 1: Site Selection

The installation environment should be dry and well-ventilated. It is best to have no obstructions in all directions, as shown in the figure. The product has a high power output, which generates a large amount of heat, so please reserve enough space for heat dissipation.
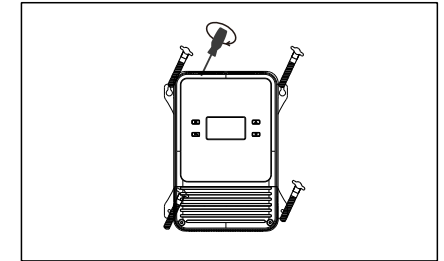
Step 2: Fixed

Due to the external design, the installation method is relatively flexible, and users can choose self-tapping screws or other screws. Firm installation is required to prevent loosening.
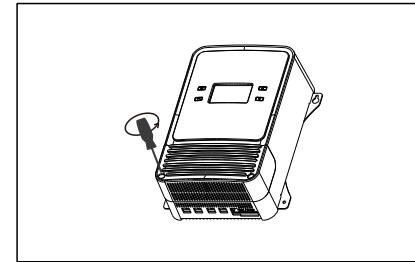
Step 3: Remove the End Cover

The screws are hidden design, so the end cover needs to be removed for wiring. Use a cross or flathead screwdriver to loosen the screws counterclockwise. There are two screws in total. After removing them, set them aside. Once the wires are connected, the end cover should be reinstalled.
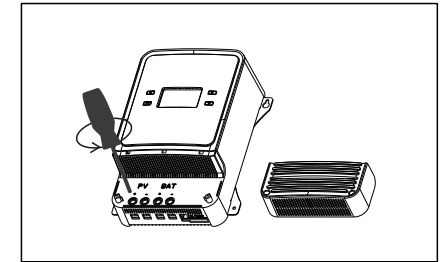
Step 4: Loosen the Screws

Place the end cover aside and use a flat or cross-head screwdriver to unscrew all the wiring screws in a counterclockwise direction until there is resistance.
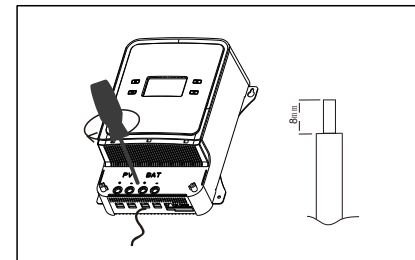
Step 5: Wiring

Prepare the wiring, including the PV positive and negative, battery positive and negative, optional communication, temperature control or parallel connection. Strip the corresponding wires and insert them into the appropriate ports. Tighten the screws clockwise in sequence. It is recommended to install circuit breakers for both PV and batteries.
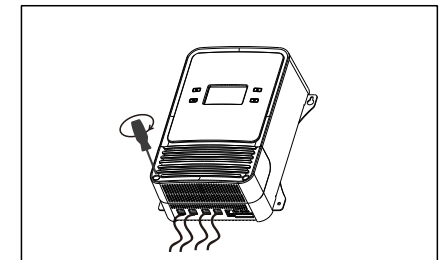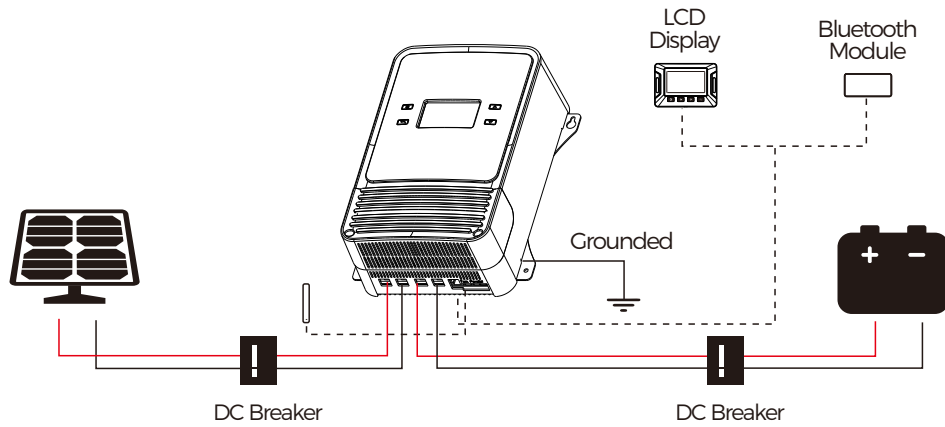
Step 6: Replace the End Cover

Reinstall the screws that were removed in a clockwise direction.

Current	80A	100A
Air Circuit Breaker	100A	125A

7. Wire Connection Sequences

LCD Display

Bluetooth Module

Grounded

DC Breaker

DC Breaker

During installation of your MPPT controller, please follow the order of connection below:

Step 1: Connect the battery, and it is recommended to choose the suitable wires according to the actual situation.

Step 2: Connect the solar panel or other DC input sources.

Note: When connecting the wires, first use a screwdriver to loosen the terminal counterclockwise, insert the prepared wire, and then tighten it clockwise again.

Solar Input Current	20A	40A	60A	80A	100A
Wire Cross Section Area (mm²)	4	8	12	16	20
Wire AWG	11	8	6	5	4

8. RS485(RJ12), the protocol supports Modbus-RTU16

Data baud rate: 9600 bps
Data bits: 8 bits
Parity check bit: None
Stop bit: 1 bit
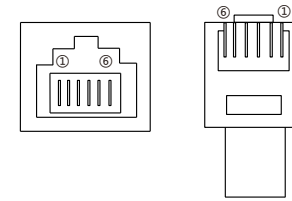
RS485 PIN (RJ12)					
PIN-1	PIN-2	PIN-3	PIN-4	PIN-5	PIN-6
VDD	VDD	GND	GND	D-	D+

*Supports 3.3V power supply with a supply current of 20mA. For detailed reference, please check the Modbus protocol.

9. LCD Display Interface Overview
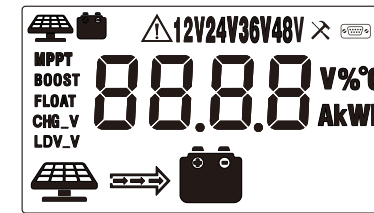
Display Section	Display Layout
Charge Status	
Charge & Set Mode	MPPT BOOST FLOAT CHG_V LDV_V
Parameter	88.8.8
Unit	V%°C AkWh
Active Functions	12V24V36V48V

Status Icon	Indication	Status	Description
CHG_V	Voltage Setting (Only for Li and User)	On	Setting Charge Voltage
		Off	Charge Voltage Has Been Set
LDV_V	Over Discharge Volt Settings (Only for Li and User)	On	Setting Discharge Voltage
		Off	Discharge Voltage Has Been Set
12V24V36V48V	System Volt	One of 12V/24V/36V/48V ON	Current System Voltage
⚠	Warning	On	System failure occur
		Off	No System failure
✕	Setting	On	Setting Mode
		Off	View Mode
▱	communication	On	In the Modbus communication
		Off	No communication
▱	Solar Icon	Steady On	Daylight Detected
		Off	No Daylight Detected
		Fast Flash	Solar System Over Voltage
▱	Battery Icon	Steady On	Battery Connected and Functional
		Off	No Battery Connection
		Fast Flash	Over Voltage
		Slow Flash	Battery Over-Discharged or Reverse Connection

* There is no charge mode displayed in the controller screen when it's in equalize charge mode.

10. Key Functionality Chart

Function Key	System Mode	Input	Input Function
◉	View Mode	Long Press	Enter SET mode
△	View Mode	Short Press	View Previous Page
▽	View Mode	Short Press	View Next Page
↰	View Mode	Short Press	———

Function Key	System Mode	Input	Input Function
◉	SET Mode	Long Press	Save Data & Exit SET Mode
		Short Press	Next Setting Item
△	SET Mode	Short Press	Increase Parameter Value
▽	SET Mode	Short Press	Decrease Parameter Value
↰	SET Mode	Short Press	Exit SET Mode Without Saving

11. Introduction to the menu and settings

LCD Screen Display Cycle

Charging PV Voltage — MPPT 12V 90.2 V 【UP】【DOWN】

Battery Voltage — MPPT 12V 13.6 V — Default Page 【UP】【DOWN】

Battery Capacity — MPPT 12V 100 % 【UP】【DOWN】

Charging Amperage — MPPT 12V 15.1 A 【UP】【DOWN】

【DOWN】【UP】

Error Code — MPPT 12V E00 【UP】【DOWN】

Controller Temperature — MPPT 12V 40 ℃ 【UP】【DOWN】

Charging Watt-hour — MPPT 12V 120 Wh

【DOWN】【UP】
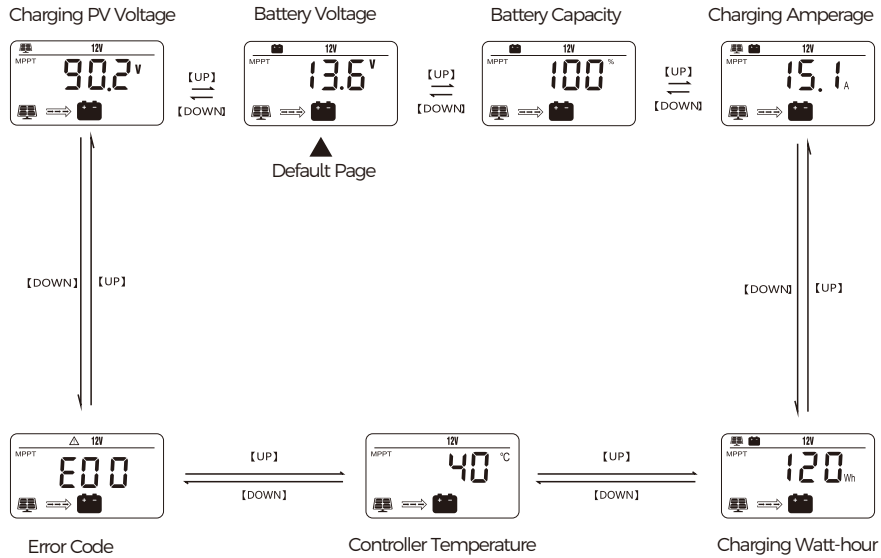
The battery voltage view will be displayed by default. Use the up and down arrow keys to cycle through different views. The battery voltage view will resume upon 30 seconds of inactivity. The error code view will be displayed when an error is detected. The backlight in the screen will be on for 20 seconds with any button operation.
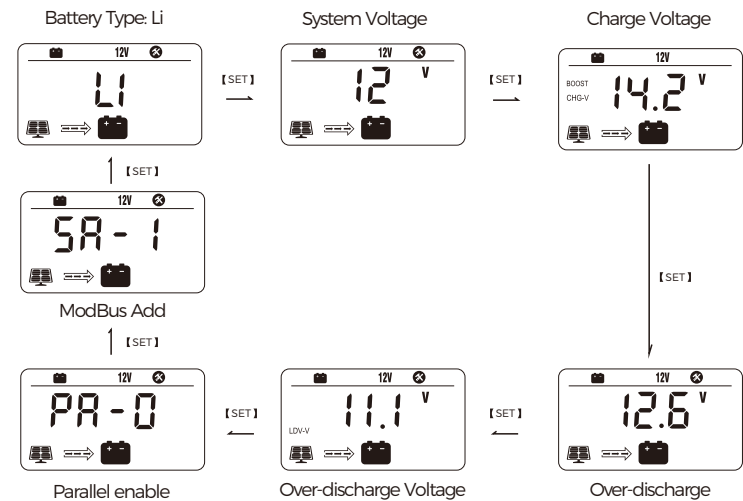
12. Key Functionality Chart

Setting Battery Mode

Enter SET mode by long pressing the SET key in any view page other than Load Mode.

Use the up and down arrow keys to select battery mode, then long press SET key to save.

USE 【UP】【DOWN】 FLd 【UP】【DOWN】 SEL

【UP】【DOWN】 — LI 【UP】【DOWN】 GEL — 【DOWN】【UP】
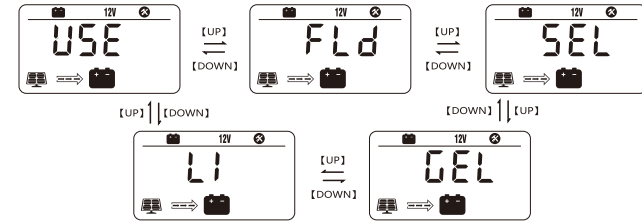
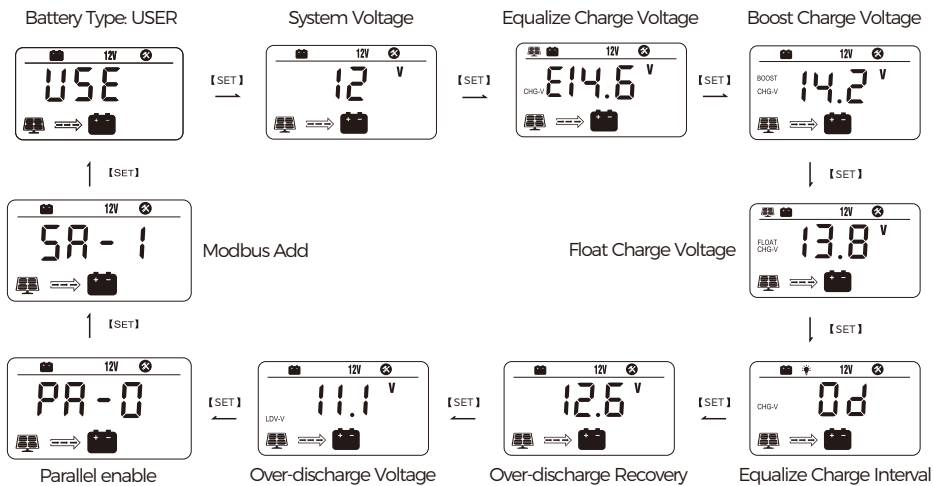| Abbreviations	Battery Types	Description
FLD	Flooded Battery	Auto-recognition with default parameters set for each type of batteries.
SEL	Sealed/AGM Battery	
GEL	Gel Battery	
LI	Lithium Battery	Some parameters can be customized.
USE	Advanced User Mode	Most parameters can be customized.

For Battery Type: Li
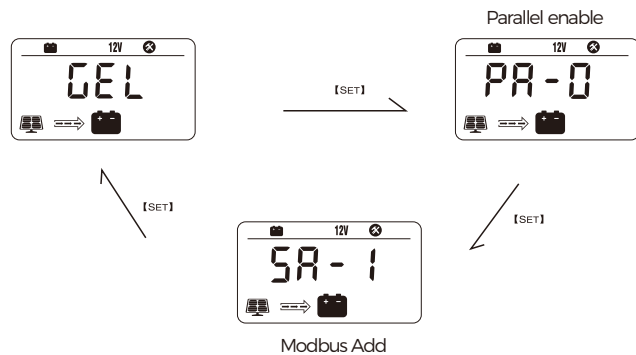

Battery Type: Li — LI 【SET】

System Voltage — 12 V 【SET】

Charge Voltage — BOOST CHG-V 14.2 V

【SET】

ModBus Add — SA-1

【SET】

Parallel enable — PA-0 【SET】

Over-discharge Voltage — LDV-V 11.1 V 【SET】

Over-discharge — 12.6 V 【SET】

For Battery Type: USER

Battery Type: USER — System Voltage — Equalize Charge Voltage — Boost Charge Voltage

【SET】 ... 【SET】 ... 【SET】

SA-1 — Modbus Add — Float Charge Voltage

PA-0 — Over-discharge Voltage — Over-discharge Recovery — Equalize Charge Interval

Parallel enable

For Battery Type: GEL/FLD/SEL

GEL 【SET】 Parallel enable PA-0

【SET】 SA-1 【SET】

Modbus Add

13. Error Code Chart

Code	Error	Description & Quick Troubleshoot
E00	No Error	No action needed.
E01	Battery Over-discharged	Battery voltage is too low.
E02	Battery Over-voltage	Battery voltage has exceeded controller limit. Check battery bank voltage for compatibility with controller.
E06	Overheating	Controller exceeds ambient temperature limit. Ensure the controller is placed in a well-ventilated cool, dry place.
E07	Environmental Overtemperature	The environment temperature sampled by external temperature probe is too high.
E10	Solar Over-voltage	Solar array voltage exceeds controller rated input voltage. Decrease the voltage of solar panels connected to the controller.
E13	Solar Reverse Polarity	Solar array input wires connected with reverse polarity. Disconnect and re-connect with correct wire polarity.
E14	Battery Reverse Polarity	Battery connection wires connected with reverse polarity. Disconnect and re-connect with correct wire polarity.

*Please contact professions for technical support on additional troubleshooting.
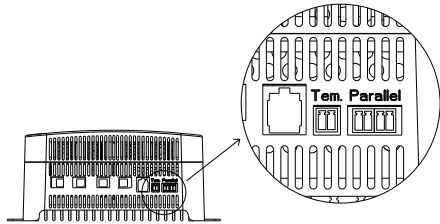
14. Parallel Settings

The controller supports up to 9 parallel operations. During the process of parallel operation, the user needs to manually activate the parallel switch and set the parallel machine address, which is the same as the Modbus address.
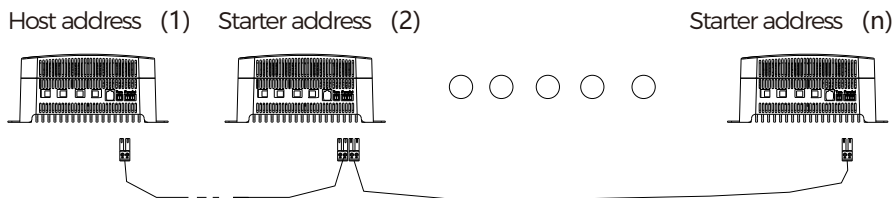
1. The parallel connection cables are ready as shown in the picture. Please make sure that the wire sequence is consistent.
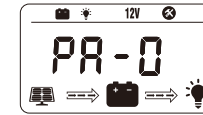
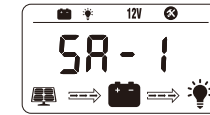red black   red black
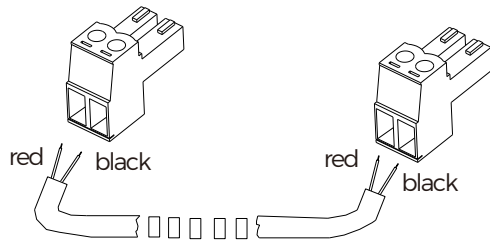
2. The parallel ports are as follows

Tem. Parallel

3. The parallel connection is as shown in the diagram below (n must be less than 10).

Host address (1)   Starter address (2)   Starter address (n)

Parallel Software Settings

PA-0   SA-1

Parallel Enable   Modbus Add

1. Parallel operation enabled, by switching between PA-0 and PA-1, PA-1 starts the parallel function, otherwise the parallel function is turned off.
2. After activating the the parallel function function, users also needs to set the master and slave machines. SA-1 represents the host with address 1, and the range can be set from SA-1 to SA-9. 2-9 represents the modbus address of the starter machine as 1-9, and the corresponding modbus communication address should also be adjusted accordingly.

15. Lithium Battery Setting

Note: The charging voltage of lithium batteries cannot be set based on the theoretical voltage parameters value of the battery, because the charging voltage and overcharging voltage of the battery manufacturer are the same. For example, for a 12V system, the theoretical charging voltage is 12.6V, if it is actually set to 12.6V, it may cause the battery BMS/protection board to activate and protect the battery.

The charge and discharge characteristic curve of Lithium iron phosphate is shown in the figure below, which is a single 18650.
The area enclosed by the dotted lines 1-4 is the battery capacity. As shown in the figure, under the condition of charging with 3.55V and discharging with 2.8V, the battery capacity accounts for more than 95%. Therefore, it is recommended that customers set the charging settings according to the table parameters.

LFP-Charge/Discharge

Legend: —— Discharge, ▬▬ Charge
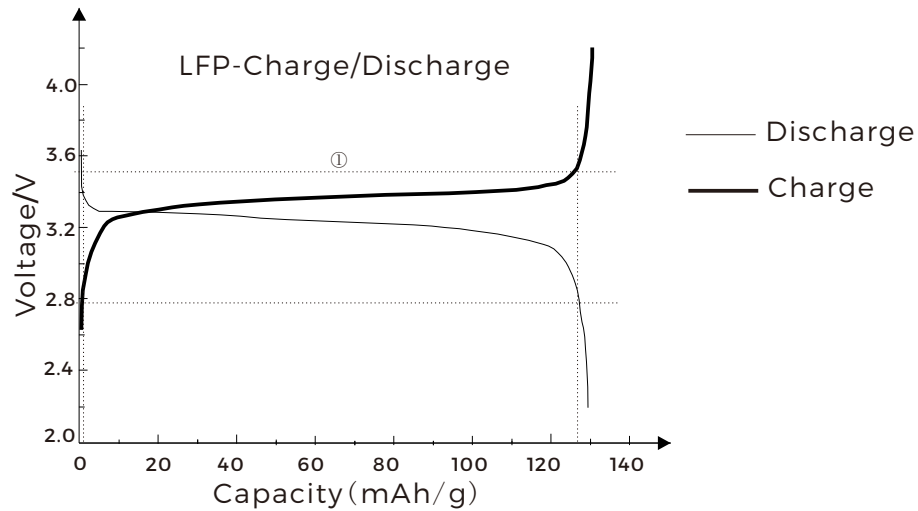
Recommended Charging Parameters Table for Lithium Iron Phosphate Batteries

System Voltage (series number)	Charging Voltage	Overcharge Protection Voltage	Overcharge Recovery Voltage	Over-discharge Recovery Voltage	Over-discharge Vlotage
Single String	3.55V	3.65V	3.4V	3V	2.8V
12V (4 in series)	14.2V	14.6V	13.6V	12.6V	11.1V
24V (8 in series)	28.4V	29.2V	27.2V	25.2V	22.2V
36V (12 in series)	42.6V	43.8V	40.8V	37.8V	33.3V
48V (16 in series)	56.8V	58.4V	54.4V	50.4V	44.4V

Note: "Overcharge Protection Voltage" and "Overcharge Recovery Voltage" in the table above refer to typical parameters in the BMS or battery protection board and are for reference only. The "Charging Voltage" corresponds to the Boost charging voltage of the controller, the "Over-discharge Recovery Voltage" corresponds to the over-discharge recovery of the controller, and the "Over-discharge Voltage" corresponds to the over-discharge voltage of the controller.

Recommended Charging Parameter Table for 3.7V Ternary Lithium Batteries

| System Voltage (series number)	Charging Voltage	Overcharge Protection Voltage	Overcharge Recovery Voltage	Over-discharge Recovery Voltage	Over-discharge Vlotage
Single String	4V	4.2V	3.9V	3.3V	3.1V
12V (3 in series)	12V	12.6V	11.7V	9.9V	9.3V
24V (7 in series)	28V	29.4V	27.3V	23.1V	21.7V
36V (9 in series)	36V	37.8V	35.1V	29.7V	27.9V
48V (12 in series)	48V	50.4V	46.8V	39.6V	37.2V

16. MPPT Introduction

MPPT is the abbreviation for Maximum Power Point Tracking. Due to the following characteristics of photovoltaic curves, when using photovoltaic energy for charging, it is hoped that the following Work Points can be traced.
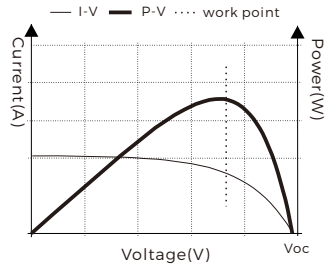
12.1 The photovoltaic power generation is particularly affected by external factors, so selecting the appropriate installation location and angle is particularly important.
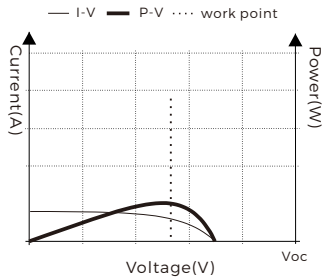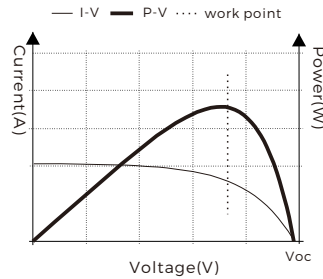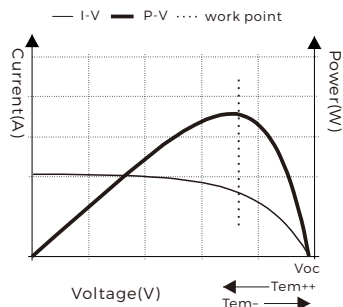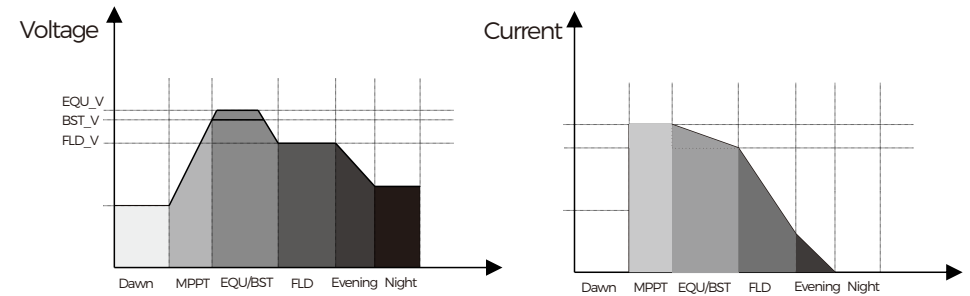

Weak Light   **Strong Light**

12.2 Photo voltaics are more sensitive to temperature changes, as shown in the figure below (the higher the temperature, the lower the open circuit voltage Voc, and the total output power changes relatively little).
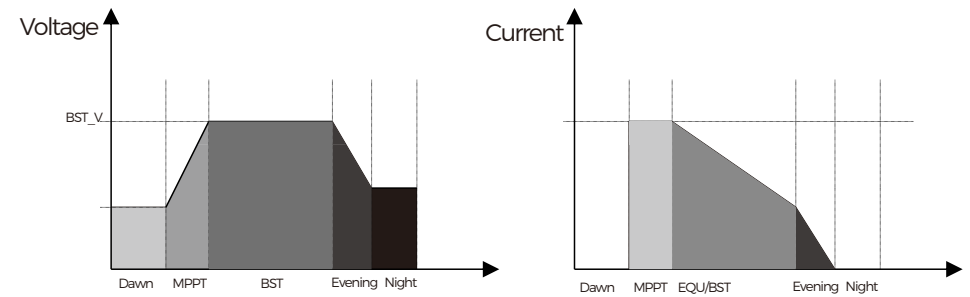

17. Introduction of lead acid and lithium battery charging

16.1 Lead-acid three-stage charging

16.2 Lithium battery charging

18. Technical Parameters

The variable "n" is adopted as a multiplying factor when calculating parameter voltages, the rule for "n" is listed as: if battery system voltage is 12V, n=1; 24V, n=2; 36V, n=3; 48V, n=4.

For example, the equalize charge voltage for a 12V FLD (Flooded) battery bank is 14.8V*1=14.8V. The equalizing charge voltage for a 24V FLD (Flooded) battery bank is 14.8V*2=29.6V.

Parameter	Value	
Model No.	BJ4880F	BJ48100F
System Wiring Grounded	Negative Grounded	
Battery System Voltage	12V/24V/36V/48V Auto (FLD/GEL/SEL/USE) Manual (LI/USE)	
No-load Loss	12ma(12V), 10ma(24V), 8ma(36V), 6ma(48V)	
Max Solar Input Voltage	<150Voc	
Rated Solar Charge Current	80A	100A
Max Solar Input Power	1200W/12V; 2400W/24V 3600W/36V; 4800W/48V	1500W/12V; 3000W/24V 4500W/36V; 6000W/48V
Operating Temperature	-25℃ ~ +45℃	
Fan-on Temperature	＞45℃	
Storage Temperature	-40℃ ~ +80℃	
IP Protection	IP32	
Net Weight	2.5 kg	2.5 kg
Communication Port	RS485(RJ12) + BT	
Support Parallel	Support parallel (up to 9 units)	
Operating Altitude	≤3000 meters	
Controller Dimension(mm)	260*200*93	

Parameter	Battery Parameters				
Battery Types	FLD	SEL	GEL(default)	USE(adjustable)	LI (adjustable)
Equalize Charge Voltage	14.8V*n	14.6V*n	--	--	--
Boost Charge Voltage	14.6V*n	14.4V*n	14.2V*n	Default: GEL	Default: 14.2V*n
Float Charge Voltage	13.8V*n			Default: GEL	--
Boost Charge Recovery Voltage	13.2V*n			Default: GEL	--
Over-discharge Recovery Voltage	--			--	--
Over-discharge Voltage	--			--	--
Auto Temperature Compensation	-3mV/2V/℃			Default: GEL	--

Accessory List	Package Status
External Temperature Sensor	Yes
External LCD Display Screen	No
Inbuilt Bluetooth	Yes
Installation Guide Board	No
User Manual	Yes

19. Product Dimension
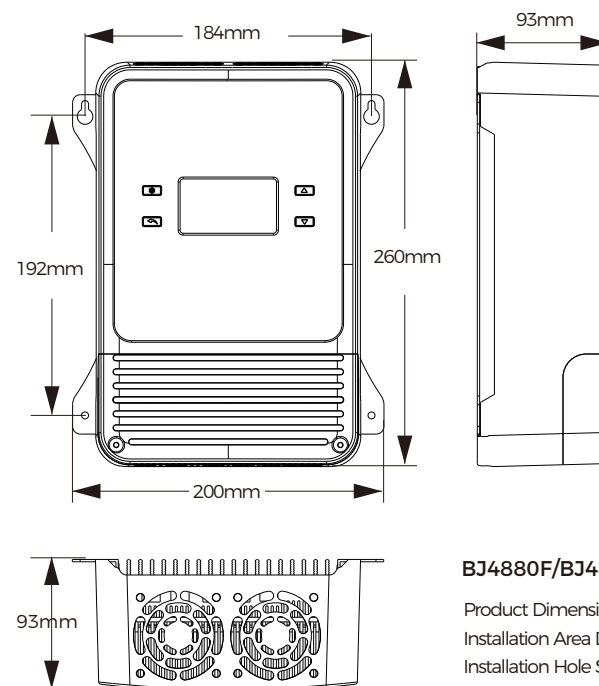
BJ4880F/BJ48100F Model

Product Dimension: 260*200*93mm
Installation Area Dimension: 192*184mm
Installation Hole Size: 5mm&   10mm
Connection Socket Size: 10*10mm

20. FAQ

Q1: What information should I provide with BougeRV to get technical support faster and better?

Send the following information to the email: service @ bougerv.com.
1. The connection method of the solar panels (series/parallel, quantity, voltage, power).
2. The voltage and battery type of the battery.
3. The display data of the controller: battery voltage, battery charging current, the output voltage of the solar panel.
4. Connection from solar panel to controller and controller to the solar panel.
If the above information can be provided with pictures or videos, BougeRV can provide you with technical support faster.

Q2: Why is the battery not charging after I connected the solar panel?

There may be the following reasons: the solar panel line is connected reversely, the output voltage of the solar panel is lower than the battery voltage, and the output voltage of the solar panel is greater than the maximum PV input voltage.
1. Check if the polarity from the PV terminal to the controller is correct.
2. Check the output voltage of the solar panel. If the output voltage of the solar panel is lower than the battery voltage, you need to connect the solar panels in series to increase the voltage; if the output voltage of the solar panel is higher than 150V, you need to reduce the output of the solar panel.

Q3: Why does the controller show that the output current is very low?

1. The output current may be low due to weak light or shadows of solar panels.
2. The battery may enter the float charge stage and therefore the current drops. You can use a multimeter to check the battery voltage to determine whether the battery enters the float charge stage.

Q4: What matters should be paid attention to in the daily use of the controller?

1. Ensure that the system voltage and battery type of the controller are set correctly.
2. The controller should be installed as close to the battery as possible to avoid the voltagedrop caused by too long wires, which will affect the normal voltage judgment.
3. The controller should be installed in a well-ventilated, non-humid environment.

Q5: What should I pay attention to when connecting to APP?

1. Bluetooth function is available and turning on in your mobile phone.
2. GPS function is available and turning on in your mobile phone.
3. Android firmware version 5.0 or above, or IOS firmware version 9.0 or above.