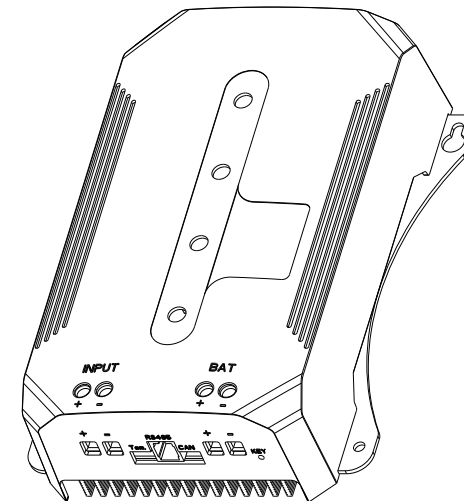# Buck-Boost MPPT Solar Charge Controller

Negative Grounded - APP Operation

M4820CUK

(SEL/GEL/FLD/LI/USE)

Download on the **App Store**

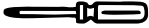GET IT ON **Google Play**

User Manual

Download APP on Apple Store / Google Play Store

*We may modify these specifications without prior notice.

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

- During the installation of the controller, please pay attention to the safety of the electricity when using electric tools.
- If the Voc voltage of PV exceeds the safety voltage of human body, the controller must be installed by professionals with relevant qualifications.
- There may be sparks during the wiring, be sure to pay attention to fire safety. The installations in flammable and explosive places are prohibited.
- Short-circuit of batteries are prohibited.
- Set t he parameters according to the actual battery specifications.
- Be sure to install the controller out of the reach of infants and young children.
- Ensure that the installations are firm and reliable.
- Please select cables with corresponding specifications according to the controller model no. and actual current.
- Lithium batteries are forbidden to be reversed, and the activation process may be dangerous.

| Solar Input Current	5A	10A	20A	30A	40A
Wire Cross Section Area (mm^2)	1.5	2.5	5	8	10
Wire AWG	15	13	10	8	7

3. Product Features

Dear users, thank you for choosing this product. This product is a negative grounded buck-boost DCDC (the input can be PV or a common DC source) charge controller. When the input is PV, it adopts MPPT digital charging method. The running status and related parameters can be displayed through an external screen (the external screen is an optional accessory). It is widely used in small power generation systems and energy storage systems. This product has the following salie nt features:

**DCDC buck-boost charging method / negative grounded design / standard Bluetooth**

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

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

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

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

e. 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.

f. Liquid crystal display: through an external LCD screen, users can check the system's operating status and set some parameters (an external LCD screen is an optional accessory).

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

h. 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.

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

j. Support RS485 communication mode, adopt Modbus communication protocol (support custome r customized protocol and communication media).

k. Support CAN communication mode, adopt RV-C protocol (RV-C is a communication protocol based on CAN for vehicle entertainment).

l. 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).

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

n. Industrial-level design: it can be used in various harsh environments.

o. 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.

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

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

4. Device Diagram
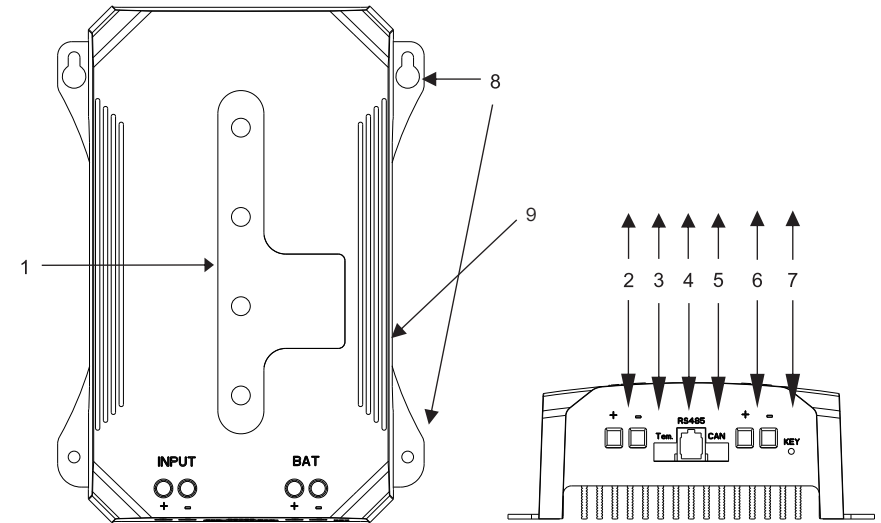
#	Description	#	Description
1	LED Indicator (Charge, Battery, Battery type, Fault)	6	Battery Wiring Terminals
2	Input Wiring Terminals	7	Pressing Keys (Flush Mount)
3	External Temperature Sensor Terminal	8	Installation Mounting Holes
4	RS485 Communication & External LCD screen Port (Rj12)	9	Grounding Screws
5	CAN Communication Port		

5. Mounting Instruction
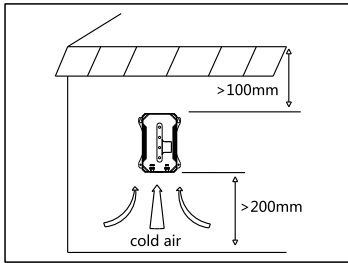
Step1: site selection

Installation environment requirements: dry, ventilated and sufficient air circulation range up and down
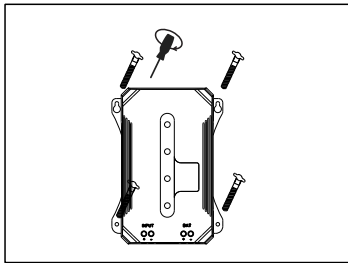
Step2: fix

At the position of step1, fix the device with screws according to the principle from top to bottom
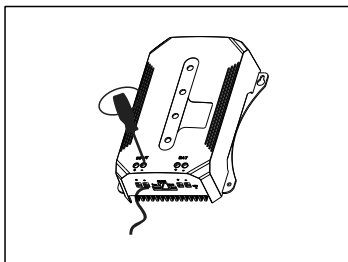
Step3: wiring

Prepare the wire, strip off the thread end, loosen the screw counterclockwise first, insert the thread end, and tighten it clockwise

6. Wire Connection Sequences
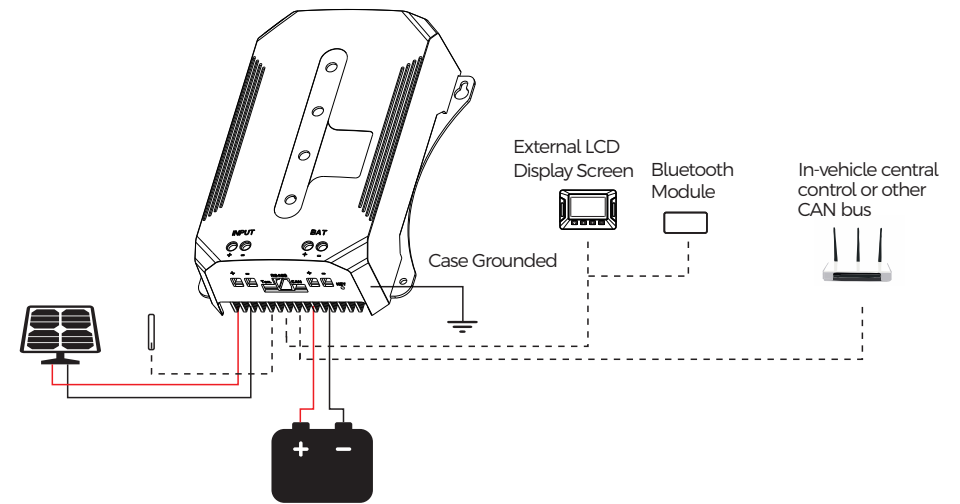
Step 1: Connect the battery, it is recommended to select the appropriate wire according to the actual situation.

Step 2: Connect solar panels or other DC input sources.

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

7. RS485/External LCD Display Screen and CAN Connection Diagram

RS485 PIN (RJ12)					
PIN-1	PIN-2	PIN-3	PIN-4	PIN-5	PIN-6
VDD	VDD	GND	GND	D-	D+

* Support 3.3V power supply, the supply current is 20mA

CAN PIN	
PIN-1	PIN-2
CAN-L	CAN-H

* CAN baud rate: 250000bit/s using RV-C protocol

8. Key Operation

8.1 Preparation

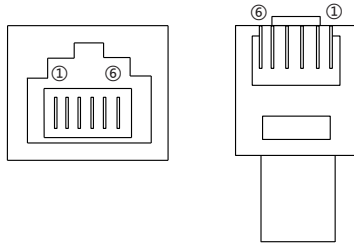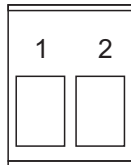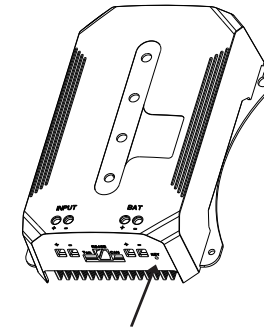Since the keys of this product are hidden keys, you need to prepare a non-metallic rod with a diameter of about 1mm before setting. Use this rod and insert it in the direction of the arrow below to realize the keys operation.

8.2 Key Operation

Use a tool to insert into the key hole. The keys are divided into long press and short press operation. For details, refer to the table below.

Status Indication Mode: each indicator light indicates according to the current working mode and status of the controller.

Battery Type View Mode: each indicator light indicates the current battery type.

Battery Type Setting Mode: each indicator light indicates the selection of battery type according to the current operation, and the next step can be set.

Function Key	Current Mode	Input	Input Function
	Status Indication Mode	Short Press	Enter battery type viewing mode
		Long Press	Enter battery type setting mode
	Battery Type View Mode	Short Press	--
		Long Press	Enter battery type setting mode
	Battery Type Setting Mode	Short Press	Battery Type Switching
		Long Press	Confirm to save the current setting and return to the status indication mode

9. Mode Description

9.1 Status Indication Mode

○——Off   ● —— Steady on   ◐ —— Slow Flash   ◑ —— Fast Flash

Function Key	Current Mode	Input		Input Function
CHG (Green)	Charging Status	Off	○	Charging not activated
		Steady On	●	MPPT or limited power charging
		Slow Flash	◐	Equalized/Boost/Float charging
		Fast Flash	◑	Input over-voltage
BAT (Green)	Battery Status	Fast Flash	◑	Battery over-voltage/ Over-discharge
		Steady On	●	The battery is normal
SET (Green)	Battery Type	Off	○	The rest of the lights are in status indication mode
		Steady On	●	The rest of the lights are in battery type view mode
		Fast Flash	◑	The rest of the lights are in battery type setting mode
FAULT (Red)	Fault Status	Off	○	The system is normal
		Steady On	●	There is a fault or warning in the system

9.2 Battery Type View Mode

LED	SEL	GEL	FLD	LEP12	LEP24	LEP36	LEP48
CHG	○	○	●	●	○	●	●
BAT	●	○	○	○	●	●	●
TYPE				◐			
FAULT	○	●	○	●	●	○	●

9.3 Battery Type Setting Mode

LED	SEL	GEL	FLD	LEP12	LEP24	LEP36	LEP48
CHG	○	○	◐	◐	○	◐	◐
BAT	◐	○	○	○	◐	◐	◐
TYPE				●			
FAULT	○	◑	○	◑	◑	○	◑

10. Lithium Battery Settings

Note: The charging voltage of the lithium battery cannot be set according to the theoretical voltage parameter value of the battery, because the charging voltage and the overcharging voltage of the battery manufacturer are the same. For example, the theoretical charging voltage of a 12V system is 12.6V. If it is actually set to 12.6V, it may cause battery BMS / Protection board protection.

Typical charge and discharge curves of lithium batteries
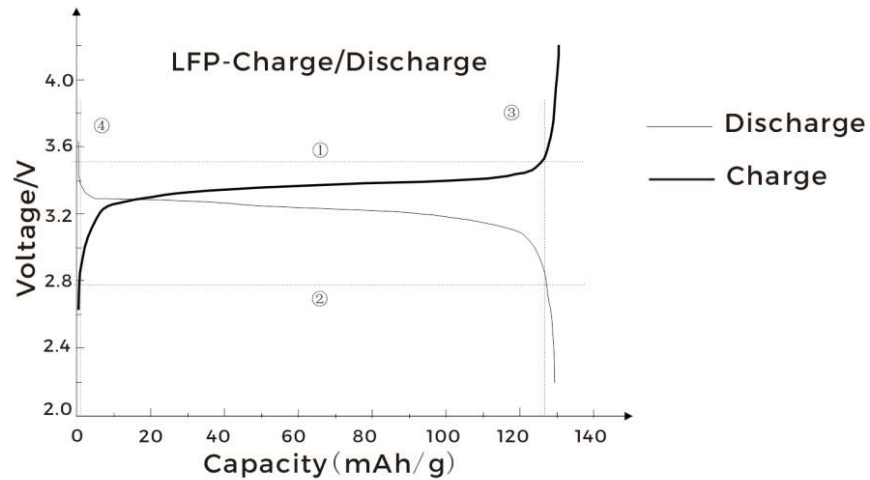
Recommended Charging Parameters Chart for Ternary Lithium Batteries

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

Recommended Charging Parameters Chart for Lithium Iron Phosphate Batteries

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

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

11. Error Code Chart

The error code of the controller can be displayed through an external LCD display screen (optional accessory), and the corresponding text description can be displayed in the mobile APP.

| Code	Error	Description & Quick Troubleshoot
E00	No Error	No action needed.
E01	Battery Over-discharged	Note that the battery voltage is too low. Until the battery is recharged to the recovery voltage.
E02	Battery Over-voltage	The battery voltage has exceeded the controller limit. Check that if the battery voltage is compatible with the controller.
E06	Overheating	The controller exceeds the temperature limit, turns off the charging. Ensure that the controller is placed in a well ventilated, cool, and dry place.
E07	Environmental Over-temperature	The ambient temperature sampled by the external temperature probe is too high.
E10	Solar Over-voltage	The solar array voltage exceeds the rated input voltage of the controller.Decrease the voltage of solar panels connected to the controller.
–	Solar Reverse Polarity	The solar panel connection wires and the controller polarity connection are reversed. Disconnect and reconnect to the correct polarity.
–	Battery Reverse Polarity	Battery connection wires and the controller polarity connection are reversed. Disconnect and reconnect to the correct polarity.

Note: The controller has "Solar Reverse Polarity" and "Battery Reverse Polarity" protections, but no relevant fault prompts are displayed.

12. Technical Parameters

(Note: *n When the system voltage is 12V, n=1; when the system voltage is 24V, n=2; when the system voltage is 36V, n=3; when the system voltage is 48V, n=4)

Parameter	Value
Model No.	M4820CUK
System Model No.	Negative Grounded
Battery System Voltage	12V/24V/36V/48V Auto (FLD/GEL/SEL/USE) Manual (LI/USE)
No-load Loss	12mA(12V), 10mA(24V) 5mA(36V), 5mA(48V)
Max Solar Input Voltage	<150Voc
Rated Solar Charge Current	20A
Max Solar Input Power	300W/12V ; 600W/24V 900W/36V ; 1200W/48V
Operating Temperature	-35℃ ~ +45℃
IP Protection	IP32
Net Weight	1.2 kg
Communication Port	RS485 (RJ12)+Bluetooth(APP)
Operating Altitude	≤3000 meters
Controller Dimension(mm)	220*159*58

Parameter	Battery Parameters				
Battery Types	FLD	SEL	GEL(default)	USE(adjustable)	LI (adjustable)
Equalize Charge Voltage	14.8V*n	14.6V*n	--	Default	--
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	–			Default: GEL	--
Over-discharge Voltage	–			Default: GEL	–
AutoTemperature Compensation	-3Mv/2V/℃			Default: GEL	--

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

13.Product Dimension

R2.5
R5.0

220
166.3

INPUT
+ -
BAT
+ -

58
129.7
159

+ - Tem. RS485 CAN + - KEY
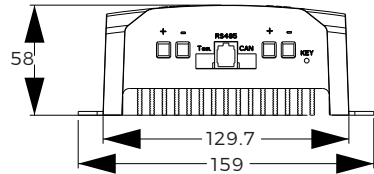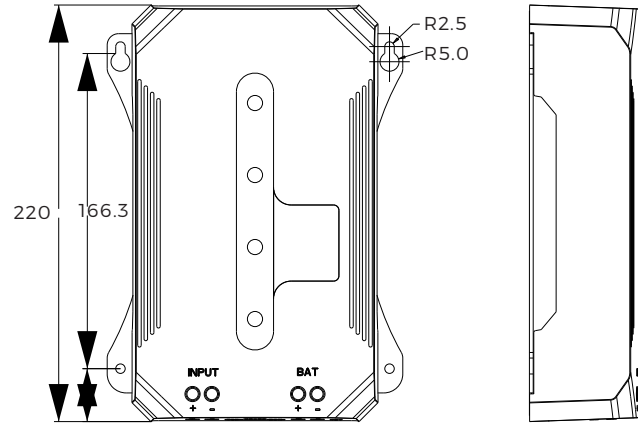
Model : M4820CUK
Product Dimension : 220*159*58mm
Installation Area Dimension : 166.3*142mm
Installation Hole Size : 5 & 2.5mm
Connection Socket Size : 7.5*8.5mm