MPPT-DC series
Fifth generation
Solar charge controller
(Constant Current, Boost)
3.2/6.4V，20/30A

User Manual

User Manual_MPPT-DC series_PD
CE, RoHS, ISO9001:2015
Subject to change without notice!

Dear Clients,

Thanks for selecting the MPPT-DC series solar controller!Please take the time to read this user manual, this will help you to take advantage of controller' s new features.This manual gives important recommendations for installing, programming, using and so on. Read this user manual in full before installing or connecting the solar controller.

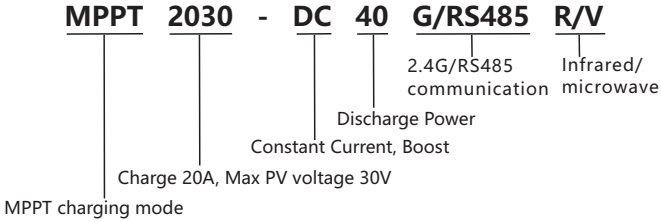
1. Product overview

MPPT-DC series lithium voltage and constant current integrated solar controller integrates MPPT solar maximum power tracking, charge management, LED voltage and constant current drive, infrared/microwave induction, remote communication and other functions in one, suitable for single and two lithium batteries, widely used in solar street lights and other occasions. It has the characteristics of high reliability, high efficiency, high precision, simple installation and easy maintenance, which can reduce the cost of the entire street lamp system.

1.1 Product features

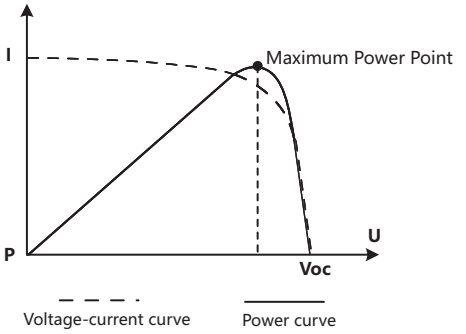
- Innovative MPPT technology, tracking efficiency >99.9%
- Full digital technology, conversion efficiency up to 92.5%
- 5 stages time and dimming can be adjusted
- Can read parameters and running status
- If battery voltage is low, it can be set to dimming
- Dimming start voltage and percentage can be set
- Day/Night threshold can adjust automatically
- Suitable for single、two Lithium battery
- Low temperature charging protection
- Lithium battery transport mode, load off in transit, activated 1 second after installation
- The lithium battery protection board can automatically activate after protection
- Charging target voltage and recovery voltage can be set
- Remote Unit to configure, with LCD display
- IP67, Strong and durable aluminum case
- Full automatic electronic protect function

1.2 Product naming rules

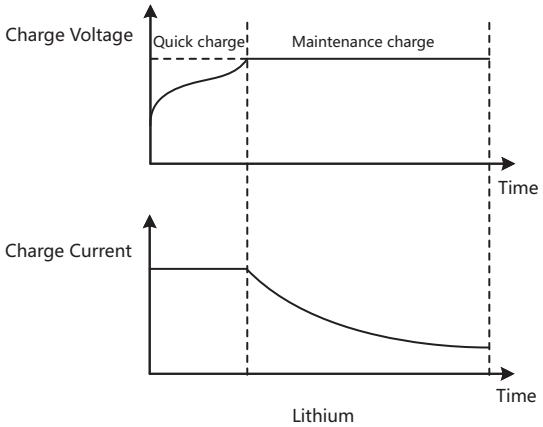


2. Instructions

2.1 MPPT charging introduction



MPPT, the full name of "maximum power point tracking", is an advanced charging method. The MPPT controller can detect the power generation of the solar panel in real time and track the maximum voltage current value (VI), so that the system can charge the battery at the highest efficiency. Compared with the traditional PWM controller, the MPPT controller can play the maximum power of the panel, so it can provide a larger charging current, generally speaking, MPPT can improve the energy utilization rate of 15% to 20% than the PWM controller. MPPT as a charging stage can not be used alone, usually need to be combined with lifting charging, floating charging, balanced charging and other charging methods to complete the battery charging. The charging process of a complete lead-acid battery includes: fast charging, maintenance charging, floating charging. The lithium battery charging process has no balanced charging and floating charging process. The charging curve is as follows:



Lithium

►**Quick charge**

In the fast charging stage, the battery voltage has not reached the set value of the full voltage (i.e. the equalization/boost voltage), the controller will charge the MPPT, which will provide the maximum solar energy to charge the battery. When the battery voltage reaches the preset value, it will be charged at constant voltage.

►**Maintenance charge**

When the battery voltage reaches the set value of the maintenance voltage, the controller will carry out constant voltage charging, this process will no longer MPPT charging, and the charging current will gradually decrease with time. There are two stages of maintenance charging, namely balanced charging and lifting charging. These two charging processes are not repeated, and balanced charging is started once every 30 days per month.

3. Safty Instruction and Waiver of Liability

3.1 Safety

①The solar charge controller may only be used in PV systems in accordance with this user manual and the specs of other module manufacturers. No energy source other than solar gen. may be connected to the solar charge controller.

②Batteries store a large amount of energy, never short circuit a bat. under all circumstances. We strongly recommend connecting a fuse directly to the battery to protect any short circuit at the bat. wiring.

③Batteries can produce flammable gases. Avoid making sparks, fire or any naked flame. Make sure that the bat. room is ventilated.

④Avoid touching or short circuiting wires or terminals. Be aware that the voltages on special terminals or wires can be as much as twice the battery voltage. Use isolated tools, stand on dry ground, and keep your hands dry.

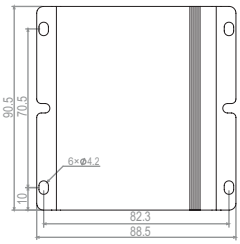
⑤Keep children away from batteries and the charge controller.

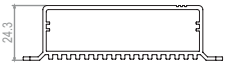
3.2 Liability Exclusion

The manufacturer shall not be liable for damages, especially on the battery, caused by use other than as intended or as mentioned in this manual or if the recommendations of the battery manufacturer are neglected. The manufacturer shall not be liable if there has been service or repair carried out by any unauthorized person, unusual use, wrong installation, or bad system design.

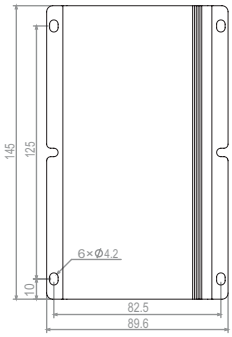
4. Dimensions

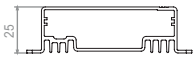
Unit:mm





MPPT2030-DC40G





MPPT3030-DC60G

5. Installation

5.1 Electrical connection diagram

The following diagrams provide an overview of the connections and the proper order.
MPPT2030 as an example:

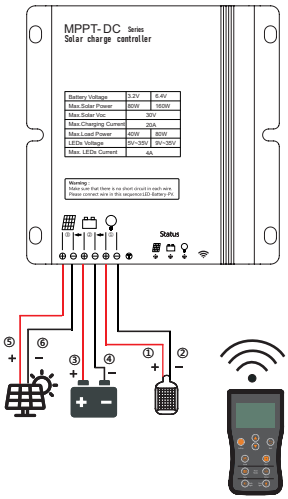


Figure 1. 2.4G remote control communication

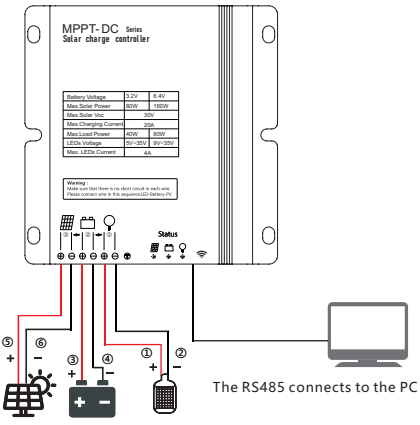


Figure 2. RS485 communication

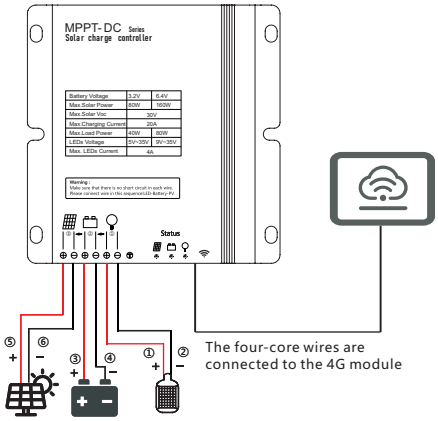


Figure 3. 4G iot module communication

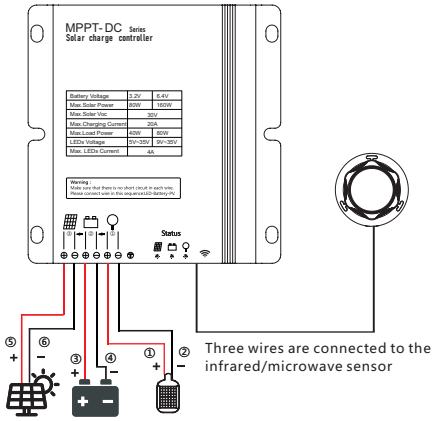


Figure 4. Infrared/microwave induction

5.2 Wiring harness schematic diagram

①RS485:

Female connector

NO.	Color	Wire
1	Black	GND
2	Blue	RS485-A
3	Green	RS485-B
4	Brown	B+

②Four-core wire:

male connector

No.	Color	Wire
1	Black	GND
2	Blue	RX
3	Green	TX
4	Brown	B+

③Infrared sensing three-core wire:

male connector

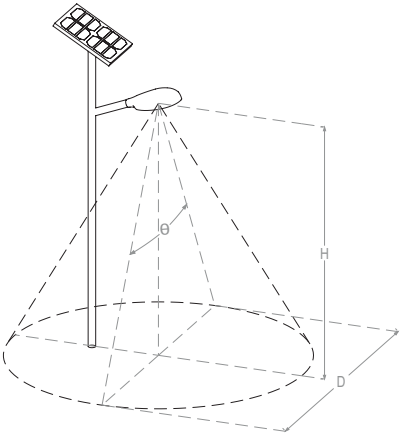
NO.	Color	Wire
1	Yellow	Signal
2	Black	GND
3	Red	3.3V

④Microwave sensing three-core wire:

Female connector

NO.	Color	Wire
1	Yellow	Signal
2	Black	GND
3	Red	B+

5.3 Sensor



Type	Angle(θ)	High(H)	Width(D)
Infrared sensor(IR)	120°	6~8m	6~8m
Microwave sensor(WB)	120°	6~8m	7~12m

Induction Introduction :
Human body infrared sensing sensor: A human body sensing sensor made using the pyroelectric effect. The infrared sensing range varies with temperature and lighting conditions. Microwave Radar Sensing Sensor: A moving object detector made using the Doppler effect principle, with high radar sensing sensitivity and is not susceptible to environmental, temperature, dust, and other impacts.

Induction Notes :
1)The microwave induction controller can only be equipped with a microwave induction probe and cannot use redExternal sensing probe, otherwise the infrared sensing probe may be damaged!!!
2)The sensor which installed in the plastic and glass lampshade will reduce the sensitivity.
3) Sensor range will change with temperature, light conditions and so on, subject to the actual measurement.
4)The distance between any inductive sensors should be greater than 3m.
5)Please ensure that there are no moving signals around the sensor, such as fan, DC motor, sewer pipe, air outlet, etc., the sensor may generate false trigger.

5.4 Wiring Procedure:

1.If an external module is available, please connect it first.
2.Connect the load with the corresponding brown(positive) and blue(negative) cables firstly, then seal them with tape.
3.Connect battery with the corresponding red(positive) and black(negative) cables. Load will be on after a moment.
4.Connect panel with the corresponding red(positive) and black/green(negative) cables, the load will be off after a moment , and the controller begins charging.
5.Refer to **10.Faults & Alarms** to confirm the LED display status.

- Make sure the wire length between battery and controller is as short as possible.
- Recommended minimum wire size: 20A: 4mm²; 30A:6mm²

5.5 Transportation mode

The controller is generally integrated with the lithium battery in the lithium battery pack for transport, if the controller works normal during transport, it will waste of energy and increase the transport risk. If the controller is set to transport mode, the load has no output, then the power consumption is reduced by about 60%, to avoid lithium battery voltage too low.

5.5.1 Open circuit protection

If the controller is only connected with the battery, but not connected with solar and load, the controller will enter transportation mode after 5 minutes.

5.5.2 Press the "Test" key in transport mode

Press the "Back" and "Backlight" key at the same time , the remote controller will enter into transport mode.

Press the "Test" key in the transport mode, the remote controller displays "Transport OK" and will beep a long sound, the controller enters into transport mode.

——For detailed Settings, please refer to the SU10G intelligent remote control instruction manual.

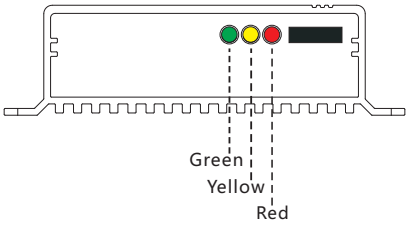
※ After the controller enters transport mode, the red LED will super slow flash(0.2s on/5s off) ,the remote control displays "Open CP".

5.5.3 Exit the transportation mode

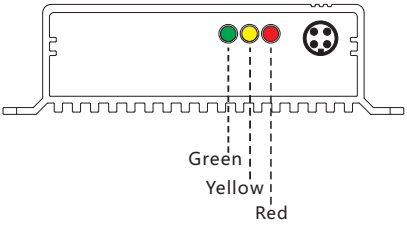
When the load is properly connected, press the test key or connect the solar more than 1 second during daytime , the transport mode will terminate and the controller will work normally.

6. LED indications

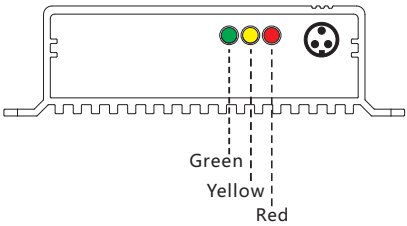
6.1 Controller LED light status indication



2.4G version



RS485/Four-core cable version



Infrared/microwave three-core version

※ Infrared sensing controller, the controller end is a male three-core wire.
※ Microwave sensing controller, the controller end is a female three-core wire.

LED	Status	Function
Green LED	On	Solar panel is correctly connected, but not charged
	Fast flash(0.1on/0.1s off)	MPPT charging
	Slow flash(0.5 on/2s off)	Charging
Yellow LED	On	Battery is normal
	Slow flash(0.5 on/2s off)	Battery voltage is low
	Fast flash(0.1 on/0.1s off)	Low voltage protection
	Off	Over voltage protection
Red LED	Off	Work normal
	On	The output power is 0
	Super slow flash(0.2 on/5s off)	Open circuit or transport mode *1
	Fast flash(0.1 on/0.1s off)	Short circuit or Over current protection *2
	Flash(0.5 on/0.5s off)	Over temperature protection

*1.If the controller is in transport mode, the red LED is super slow flash(0.2s on/5s off), the green and yellow led is off.
*2.Detailed fault in formation can be read by SU10G remote controller.

7. Factory default Settings

7.1 Factory default Settings

Pressing the "Parameter" key of the SU10G to read the setting parameters of the controller.

Num	Name	Setting data	Setting range
1	Time1	4.0H	0~6.5H+D2D
2	Dim1	100%	0~100%
3	Dim NP	100%	0~100%
4	Time2	0H	0~7.5H
5	Dim2	100%	0~100%
6	Dim NP	0%	0~100%
7	Time3	0H	0~7.5H
8	Dim3	100%	0~100%
9	Dim NP	0%	0~100%
10	Time4	0H	0~7.0H+T0T
11	Dim4	0%	0~100%
12	Dim NP	0%	0~100%
13	Time5	0H	0~7.5H
14	Dim5	100%	0~100%

15	Dim NP	0%	0~100%
16	D/N Thr	2.0V	1.0~7.0V
17	D/N Dly	0min	0~30min
18	Load I	0.3A	0.1~4.0A
19	Dim Auto	Yes	Yes/No
20	Dim V	3.3V	2.8~Overcharge protection voltage
21	Dim %	20%	0~40%
22	Battery	LI	LI
23	CVT	3.6V	3.0~9.0V
24	CVR	3.4V	2.9~8.9V
25	LVD	2.6V	2.4~7.2V
26	LVR	3.0V	2.6~7.4V
27	0℃ Chg	Yes	Yes/Slow/No
28	Delayoff	10s	10~150s
29	Password	0000	0000~9999

※ The password function is only applicable to 2.4G remote control mode.

7.2 Read the running status

Pressing the "Status" key of the SU10G to read the running status of the controller.

Num	Name	Name describe	Unit	Example
	Status :	Charge		
1	Batt VI	Battery voltage	V	4.2V
2	Load I	Load current	A	0.00A
3	Load V	Load voltage	V	3.0V
4	PV V	PV voltage	V	4.0V
5	PV I	PV current	A	2.0A
6	Energy	Total generating capacity	AH	10AH
7	OD Times	Over discharge times	Times	0
8	FC Times	Fully charge times	Times	0
9	Day1-HV	A day ago highest voltage	V	3.6V
10	Day1-LV	A day ago lowest voltage	V	3.1V
11	Day2-HV	Two days ago highest voltage	V	3.6V
12	Day2-LV	Two days ago lowest voltage	V	3.0V
13	Day3-HV	Three days ago highest voltage	V	3.6V
14	Day3-LV	Three days ago lowest voltage	V	3.1V

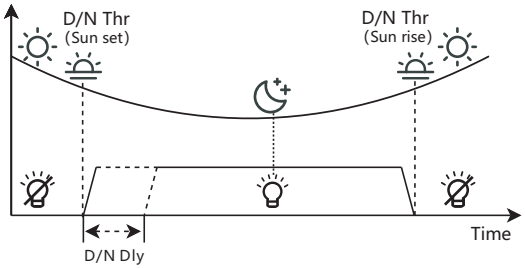
7.3 Test function

Press the test button of the SU10G intelligent remote control, and the controller will open the load for 10 second, which can help the user judge whether the system is installed correctly, and the test function will end after 10 second.

8. Operation mode

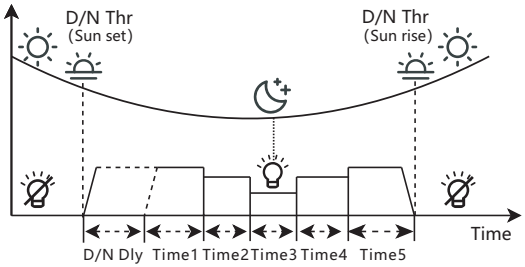
MPPT-DC series controller with advanced street light control function. The modes of lighting can be based on customer needs.

8.1 Dusk to Dawn(D2D)



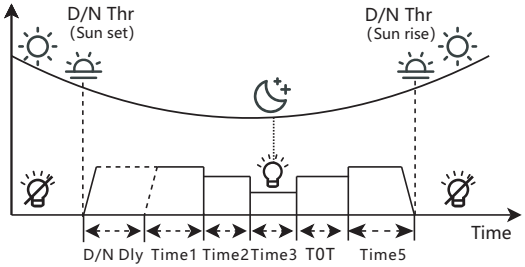
1.The MPPT-DC controller is set to D2D mode, and the manned power and unmanned power values set at the first time are valid for all time periods.
2. If "Time1" is set to D2D mode, "Time4" can not be set to T0T mode.

8.2 Five-stage Night Mode



By SU10G remote control for time 1~5 and its human power, unmanned power Settings, can achieve a variety of time and power combination mode.

8.3 T0T mode (can set the load on time before morning coming)



On the SU10G smart remote control, time 4 can be set to T0T mode. If the load is required to be turned off during the T0T period, the time 4 power is set to 0%.

※ If Time4 is set to "T0T", Time1 can not set to "D2D".

9. LVD, LVR, Threshold, Dimming

9.1 Low Voltage Disconnect(LVD)

Low voltage disconnect setting range: 2.4~7.2V

9.2 Low Voltage Reconnect(LVR)

Low voltage reconnect setting range: 2.6~7.4V

※ 1.If the controller goes into low voltage disconnect, it will restore only when the battery being recharged to the recovery voltage.

2.LVR should be higher than LVD at least 0.2V.

9.3 Day/Night Threshold, Day/Night Delay

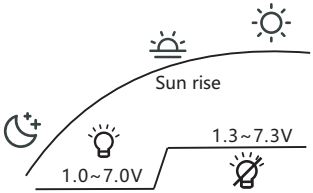
The controller recognizes day and night based on the solar array open circuit voltage. This day/night threshold can be modified according to local light conditions and the solar array used.

In the evening, when the solar array open circuit voltage reaches the setting day/night threshold, you can adjust the day/night delay time to make the load turn on a little later.

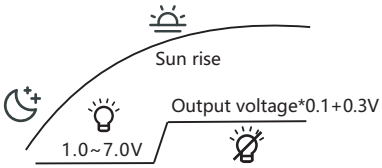
Day/Night threshold setting range: 1.0~7.0V.

Day/Night delay time setting range: 0~30min.

When setting light control point > (output voltage *0.1)，Day/Night threshold voltage of load disconnect is 0.3V higher than the setting data, means the load will disconnect when the solar voltage at 1.3~7.3V.



When setting light control point > (output voltage *0.1)，Day/Night threshold voltage of load disconnect is (output voltage*0.1+0.3V)

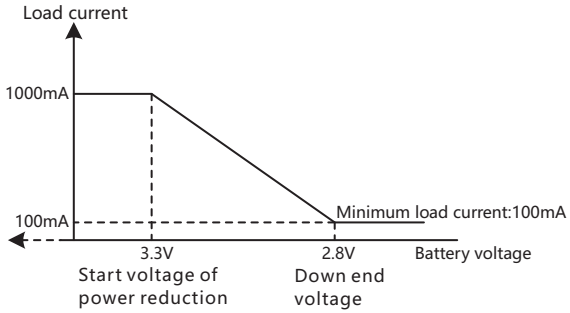


※ 1.Day/Night threshold voltage should be set around 0.1 times of open circuit voltage.

2.The controller has an automatic day/night threshold adjustment function. If the lowest voltage of solar array is higher than the setting day/night threshold, the load has no output in first night, 24 hours later the controller can automatically adjust the day/night threshold to meet the requirements of lighting at night.

9.4 Auto Dimming

The "Dim Auto" item of SU10G is set to "Yes", set "Dim V" and "Dim %" at the same time, press the "Send" key to set up the controller. when the battery voltage is lower than the voltage of "Dim V" , it starts to dimming automatically. Battery voltage reduces per 0.1V, load current decreased according to the set of "Dim %", the minimum output current is 10% of the setting current.



※ 1.If the controller is set to "Dim" or "Auto Dim", the minimum output power can be as low as 100mA.

2. The power drop point should not be greater than the overcharge protection voltage. When the battery voltage is close to the low voltage protection point, it is directly reduced to the minimum power operation.

10. Faults & Alarms

Fault	Status	Reason	Remedy
Load are not powered	low voltage protection	Battery capacity is low	Load will be reconnected when battery is recharged
	Overcurrent,short protection circuit	Loads are over current or short circuit	Switch off all loads, remove short circuit,load will be reconnected after 1 minute automatically
	Over temperature protection	Controller temperature is too high	Load reconnects after temperature reduces
High battery voltage	Over voltage protection	High battery voltage>(CVT+0.2V)	Check if other sources overcharge the battery.If not,controller is damaged
		Battery wires or damaged battery fuse battery has high resistance	Check battery wires,fuse and battery.
Battery is empty after a short time	Low voltage protection	Battery has low capacity	Change battery
Battery can' t be charged	The green light stays on	PV panel fault or reverse connection	Check panels and connection wires

11. Safety Features

•Waterproof protection

waterproofing grade: IP67

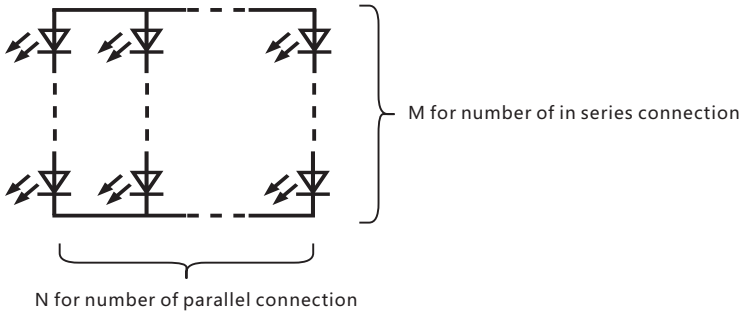
•Lithium battery BMS overcharge detection protection

When the controller detects that the BMS is overcharged, the controller immediately stops charging to prevent the high voltage of the photovoltaic end from being added to both ends of the BMS for a long time, resulting in high voltage damage to the BMS.

●Lithium battery low temperature charging protection
When 0 ° C is enabled and the ambient temperature is lower than 0 ° C, the controller stops charging to prevent irreversible damage to the lithium battery caused by low temperature charging.
●High temperature protection
When the ambient temperature or the internal temperature of the controller is higher than 80 ° C, the controller stops charging and discharging to prevent the risk of damage to the lithium battery or controller due to excessive temperature.
●Battery reverse connection protection
After the battery is reversed, the system does not work and will not burn the controller.
●PV input overvoltage protection
If the input voltage of the PV panel is too high, the controller automatically cuts off the PV input.
● PV input reverse protection
When the photovoltaic array polarity is reversed, the controller will not be damaged, and will continue to work normally after correcting the wiring error.
● Load limit power protection
When the customer sets the load current is too large, the controller load power output is rated power to ensure that the controller and LED load will not be damaged.
● Load short circuit protection
When a short circuit occurs, the controller immediately cuts off the load output to prevent damage to the controller. After the load short-circuit condition is lifted, the controller automatically restores the output within 10 seconds.
● Load open circuit protection
When the LED load light is on normally and the load connection is suddenly disconnected, the controller can immediately turn off the load output to protect the controller from damage. After the load connection is restored, the controller automatically restores the output within 1 minute, or press the test button of the remote control to restore the output.
● Anti-charge protection at night
Prevent the battery from discharging through the panel at night.
● TVS lightning protection

12. Recommended connection of LED

Following connect ways is for the LED lights
(Vf: 2.9V~3.4V; I: 300mA, Power: 1W)



Voltage range	Current range	LED chips connection
5~35V	0.1~4A	M=2~11 N=1~13

※ Note:If the current setting exceeds the current range required by the controller, the setting cannot be successful.

13. Technical Data

	Item	MPPT2030-DC40G/RS485 (Select/R/V) *1	MPPT3030-DC60G/RS485 (Select/R/V)
Battery Parameters	Max Charging Current	20A	30A
	MPPT Charging Voltage	<Charging target voltage	
	Charging voltage target	3.0~9.0V(Programmable,default: 3.6V)	
	Charging voltage recovery	2.9~8.9V(Programmable,default: 3.4V)	
	Low voltage disconnect	2.4~7.2V(Programmable,default: 2.6V)	
	Low voltage reconnect	2.6~7.4V(Programmable,default: 3.0V)	
	Battery Type	Lithium	
	0℃ Charging protection	Yes, Slow, No(Programmable,default: Yes)	
	Max volt on Bat. Terminal	10V	
Panel Parameters	Max volt on PV terminal	13~30V	
	Max input power	80W/3.2V;160W/6.4V	100W/3.2V
	MPPT tracking range	(Vb+1.0V) ~Voc*0.9 *2	
	Dusk/Dawn detect volt.	1.0~7.0V (Programmable,default: 2.0V)	
	Day/Night delay time	0~30min(Programmable,default: 0 min)	
Load Parameters	Output Current	0.1~4A(Programmable,default: 0.3A)	
	Output Voltage	9~35V	
	Output power	40W/3.2V;80W/6.4V	60W/3.2V
	Min Current	100mA	
	Current precision	±2%	
	Dimming	0~100%	
	Auto dimming	Yes, No(Programmable,default: Yes)	
	Voltage of start dimming	2.8~Charging target voltage(Programmable,default: 3.3V)	
	Dimming percentage	0~40%(Programmable,default: 20%)	
System Parameters	Max tracking efficiency	>99.9%	
	Max charge conversion	92.5%	
	Max LED driver efficiency	91.5%	
	Self consumption	<40mA@3.2V	
	Dimensions	90.5*88.5*24.3mm	145*89.6*25mm
	Net weight	307g	546g
	Recommended wire diameter	4mm²	6mm²
	Ambient temperature	-35~+60℃	
	Ambient humidity	0~100%RH	
	Protection degree	IP67	
	Max Altitude	4000m	

*1.The product with the suffix G provides 2.4G communication. R/V cannot be configured for RS485 communication.
*2.Voc means the open circuit voltage of the solar panel.
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14. Charging efficiency diagram

Product model: MPPT2030-DC40G、MPPT3030-DC60G