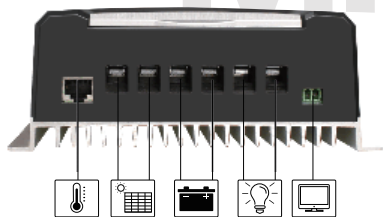


BYGD

Product manual

Solar charging controller



MPPT Solar charging controller



SUD10A 20A 30A 40A 50A 60A



1 General Information

1.1 Overview

Thanks so much for choosing our MPPT solar charger controller, SUD series. Based on common positive design and advanced MPPT control algorithm, with LED displaying running status, this product is artistic, economical and practical.

1.2Feature

- Advanced Maximum Power Point Tracking(MPPT) technology, with efficiency 97%;
- Ultra-fast tracking speed and guaranteed tracking efficiency;
- Accurately recognizing and tracking of multiple power points;
- 12/24V DC automatically identifying system voltage;
- Large color digital tube display, photo-voltaic input current and battery charging current, improve the efficiency for users to read conveniently;
- Limited power function;
- Battery temperature compensation function;
- Over-charge, over-discharge, reverse connection protection;
- 4 pcs of 5v 2A usb output,can charger 4 pcs of mobile phone at the same time quickly;
- With RS-485 communication bus interface and communication protocol, it can meet various communication requirements in different situations.



3.1 Characteristic

Item	Function
1	Colorful LED display
2	Volt/Current Switch Button
3	Load On/Off Button
4	USB Output
5	PV Terminal
6	Battery Terminal
7	Load Terminal
8	RS-485 port
9	Temperature sensor interface
10	DC Output interface

Model	SUD10A	SUD20A	SUD30A	SUD40A	SUD50A	SUD60A
Maximum PV Voltage	50V		50V		50V	
Battery Voltage	12V/24V		12V/24V		12V/24V	
Maximum Input Current	10A	20A	30A	40A	50A	60A
Over Voltage Disconnect Voltage	14.7V/29.4V		14.7V/29.4V		14.7V/29.4V	
Low Voltage Disconnect Voltage	10.5V/21V		10.5V/21V		10.5V/21V	
Boost Reconnect Charging Voltage	12.3V/24.6V		12.3V/24.6V		12.3V/24.6V	
Charging Mode	MPPT		MPPT		MPPT	
Self-consumption	<20MA		<30MA		<40MA	
Temperature compensation coefficient	-4mV/cell°C		-4mV/cell°C		-4mV/cell°C	
Product dimensions	191.7*154*54.7mm		222.6*154*54.7mm		252.6*179.2*68.8mm	
Product weight	0.91kg		1.025kg		1.9kg	
Single package size	235*185*100mm		265*185*100mm		295*210*115mm	
Carton size	485*385*320mm		545*385*320mm		605*435*365mm	
Packing quantity	12pcs/ctn		12pcs/ctn		6pcs/ctn	

1.4 Maximum Power Point Tracking Technology

Due to the nonlinear characteristics of solar array, there is a maximum energy output point(Max Power Point) on its curve. Traditional controllers, with switch charging technology and PWM charging technology, can't charge the battery at the maximum power point, so can't harvest the maximum energy available from PV array, but the solar charge controller with Maximum Power Point Tracking(MPPT) Technology can lock on the point to harvest the maximum energy and deliver to the battery.

Generally, due to the principle of energy conservation, V_{MPP} is always higher than V_{Bat} , and I_{Bat} is always higher than I_{PV} . The greater the difference between V_{MPP} and V_{Bat} , the greater the difference between I_{PV} and I_{BAT} . The greater the difference between solar panels and battery. The conversion efficiency of the system is reduced, so the conversion efficiency of the controller is particularly important in solar controllers.

Figure 1-2 is the Maximum power point curve, and the shaded area is the charging range of the PWM solar charge controller. It can be clearly seen that the MPPT mode can improve the utilization rate of solar energy resources. According to our tests, MPPT solar charge controllers can improve efficiency by 20% to 30% compared to PWM controllers.

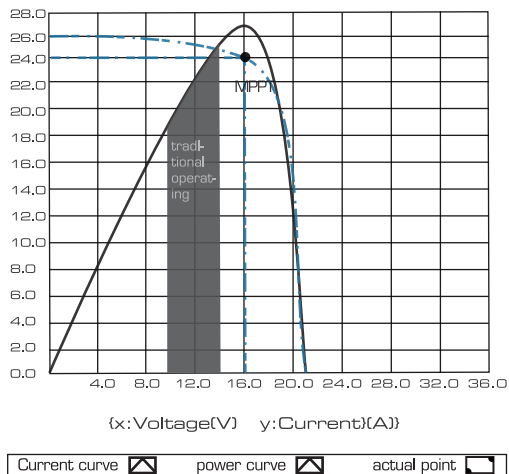


Figure 1-2 Maximum Power Point Curve

In actual applications, due to the shadows of clouds, trees or snow, there may be multiple MPPs in the solar panel, but in reality there is only one real Maximum Power Point, as shown in the following 1-3:

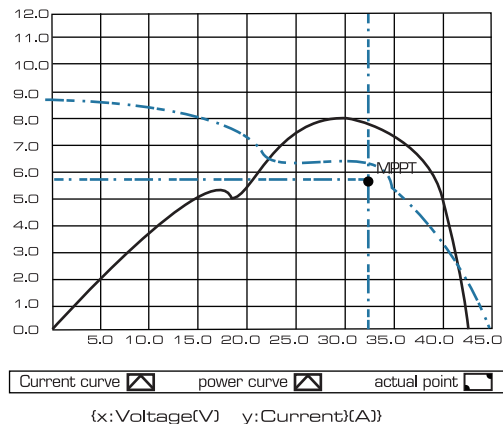
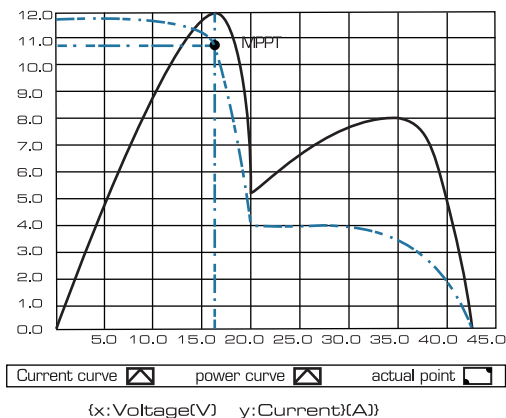
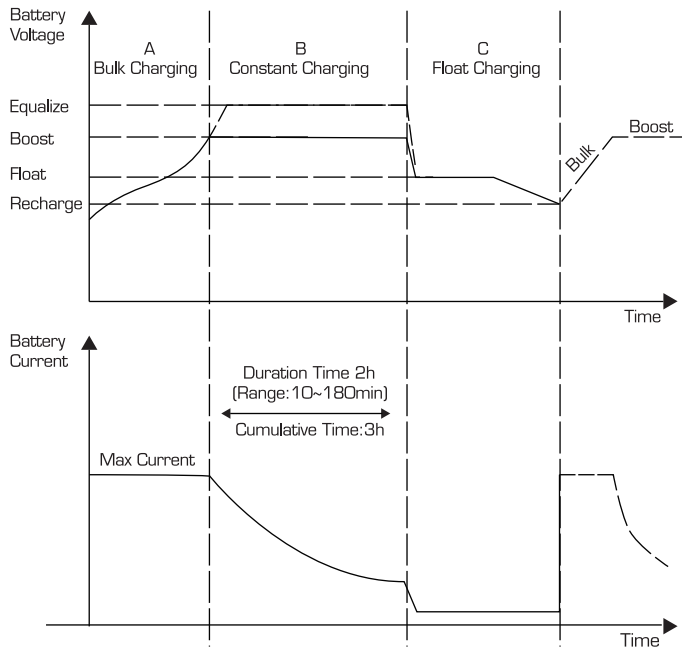


Figure 1-3 Multi-MPP Curve

Our MPPT controller can quickly and accurately track the actual MPP, improve the utilization rate of solar panels, and avoid waste of resources.

1.5 Battery Charging Stage

The controller has 3 stages battery charging algorithm(Bulk Charging, Constant Charging and Float Charging) ,which is used for rapid, efficient and safe battery charging and can effectively extend the battery life.



—Figure 4

Figure 4 Schematic diagram of battery charging stage

A.Bulk Charging

At this stage, the battery voltage has not reached the constant voltage, the controller works in constant current mode and outputs its maximum value. Battery current (MPPT charging).

B.Constant Charging

When the battery voltage reaches the constant voltage set point, the controller will start to work in a constant charging mode, while the charging current will gradually decrease, the process is not MPPT charging. There are two stages of constant charging, equalization and boost, and the two stages are not continuously performed during the full charging process to avoid excessive gas evolution or overheating of the battery.

C.Float Charging

After the constant voltage stage, the controller reduces the charging current to the floating voltage set point, there will be no chemical reaction at this stage, and all the charging current will be converted into heat and gas. The controller then reduces the voltage to the floating stage and charges with a smaller voltage and current. It will lower the temperature of the battery while preventing the gas and charging of the battery.

2.1 Installation Instructions

- Please read all instructions and precautions in the manual carefully before installation and use.
- Be very careful when installing the battery, especially lead-acid batteries, please wear eye protection and wash with clean water and Clean any contact with battery acid.
- Avoid placing metal objects near the battery to prevent the battery from short-circuiting.
- When charging the battery, acid gas may be generated to ensure that the surrounding environment is well ventilated.
- When installing outdoors, avoid direct sunlight and infiltration of rain.
- It is recommended to install a suitable fuse or circuit breaker outside the controller.
- Make sure that the connectors are tightened to avoid fire caused by poor contact caused by the wire insulation burning to the surrounding combustibles.
- It is recommended to use gel sealed batteries. For other types, please refer to the parameters provided by the battery manufacturer.
- The system connection cable is selected according to the current density of not more than $5\text{A}/\text{mm}^2$, and it must comply with national and local electrical codes.

2.2 PV Array Requirements

- Serial connection(string) of PV modules

As the core component of the solar system, the controller can be applied to various types of photovoltaic modules. And can maximize the conversion of solar energy into electrical energy. Therefore, according to the MPPT controller's open circuit voltage and maximum power point voltage, the series number of different types of photovoltaic modules can be calculated. The following table is for reference only: PV Array Maximum Power

system Voltage	36cell Voc<23V		48cell Voc<31V		54cell Voc<34V		60cell Voc<38V	
	Max optimal		Max optimal		Max optimal		Max optimal	
12V	4	2	2	1	2	1	2	1
24V	6	3	4	2	4	2	3	2
system Voltage	72cell Voc<46V		96cell Voc<62V		Membrane Voc<80V			
	Max	optimal	Max	optimal				
12V	2	1	1	1	1			
24V	3	2	2	1	1			



Maximum power of solar panel

The MPPT controller has a charging current limit function. Even if the input power of the solar panel exceeds the rated charging power of the controller, the controller will charge the battery according to the rated power.

1) The actual power of the solar panel \leq the rated charging power of the controller. The controller charges the battery with the maximum power of the photovoltaic array.

2) When the actual power of the solar panel $>$ rated charging power of the controller, the controller charges the battery at the rated power.

If the power of the photovoltaic array is higher than the rated charging power of the controller, the charging time at the rated power will be extended, so more energy can be obtained to charge the battery.

<p>WARNING:</p> 	<p>When the polarity of the DC positive and negative poles of the solar panel is wrong, the controller will be damaged: the actual operating power of the solar panel is three times the rated charging power!</p>
<p>WARNING:</p> 	<p>When the reverse polarity of the solar panel and the operating power of the solar panel are greater than 1.5 times the rated charging power, the controller will be damaged!</p>

When the solar panel is positive, the actual operation of the solar panel shall not exceed three times the rated charging power; when the solar panel is reversed, the actual operating power shall not exceed 1.5 times the rated power of the controller.

2.3 Installation and wiring



Warning: Risk of explosion! Never install the controller and the open battery in the same confined space!

Do not install in a closed environment where battery gas may collect.



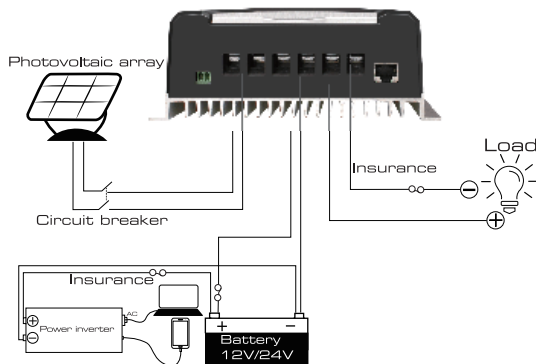
Warning: danger of high voltage! The photovoltaic array may generate a very high open circuit voltage, and the circuit breaker or fuse should be opened before wiring, be careful during wiring!



Note: When installing the controller, ensure that there is enough air flowing through the heat sink of the controller.

There is 150mm space to ensure natural convection heat dissipation. If installed in a closed box, make sure to pass

The cabinet is reliable in heat dissipation.



Wiring diagram

1) Please install the solar system components according to the order of the above icons, and pay attention to whether the "+" and "-" pole leads of each component are connected correctly.

2) After the installation is complete, turn on the battery power supply and observe whether the battery voltage of the LED screen on the controller is normal.

3) Pay attention to the battery safety installation position as close as possible to the battery end, the recommended distance is not more than 150mm.

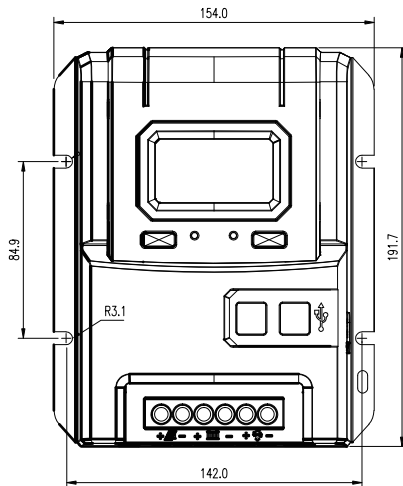
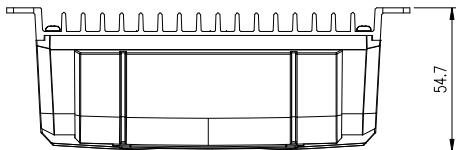
note:

1) The controller battery temperature is a fixed value of 25°C when no remote temperature sensor is connected.

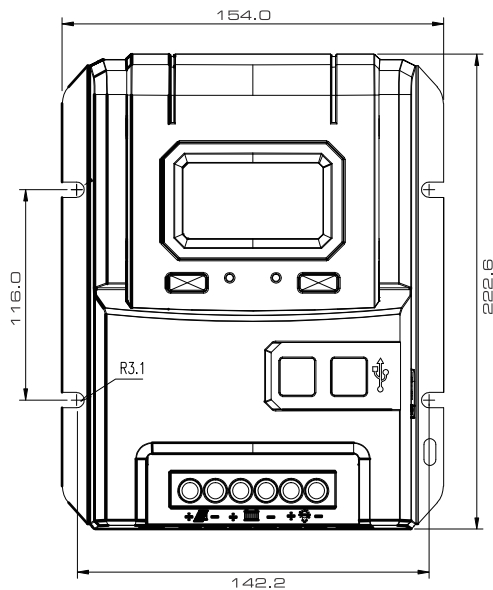
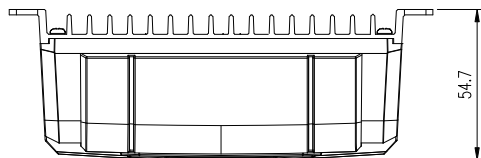
2) If an inverter is connected to the system, please connect the inverter directly to the battery. Do not connect to the load side of the controller

2.3 Controller installation dimension drawing

SUD10A/SUD20A



SUD30A/SUD40A



SUD50A/SUD60A

