LDSOLAR

User's Manual

SOLAR CHARGE CONTROLLER

Sky Dream Series

12V/24V 10A 20A 30A 40A 50A 60A

48V 30A 40A 50A 60A

Your battery guard

※ Thank you for selecting Sky Dream series PWM solar charge controller.

Please read this manual carefully before using the product.

1.Overview

Thank you for selecting the Sky Dream series common positive solar charge controller(SD in short). The SD series controller is a PWM charge controller with built in LCD display that adopts the most advanced digital technique. The intelligent charging process has been optimized for long battery life and improved system performance.The multiple load control modes enable it can be widely used on solar home system, traffic signal, solar street light, solar garden lamp, etc. The features are listed below:

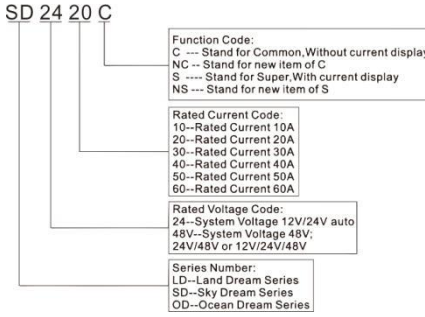
- Adopt high quality components of ST,Samsung and Fenghua Hi-Tech, ensure product using lifespan.
- Molded red and black terminals distinguish plus and minus poles, the product is more safer and more reliable.
- Controller can work continuously at full load within the environment temperature range from -20 to 55 ℃.
- 3-Stage intelligent PWM charging：Bulk, Boost and Float charging mode.
- Support 5 charging options: Sealed, Gel,Flooded and LiFePO4, Li(NiCoMn)O2 battery.
- LCD display design, dynamically displaying device's operating data and working condition.
- Double USB design for 10A and 20A,one USB for 30Aand 40A, the power supply charge for more electronic devices.
- With humanized button settings, operation will be more comfortable and convenient.
- Multi load control modes.
- Energy statistics and working record function.
- Battery temperature compensation function.
- 12 Electronic protections.

2.Product Feature

①	Temperature Sensor	⑤	USB Output Ports※
②	LCD	⑥	Load Terminals
③	Operation Button	⑦	Battery Terminals
④	Menu Button	⑧	PV Terminals

※ USB output ports provide the power supply of 5VDC/1A and have the short circuit protection.

3.Naming Rules of Controller models



4.PWM controller charging technology

Due to the nonlinear characteristics of solar array, there is a maximum energy output point (Max. Power Point) on the curve. PWM controllers, with switch charging technology and PWM charging technology, can't charge the battery at the maximum power point,because PWM controller is pulses direct connection from solar panel to battery.the Input voltage (V_{Mpp}) pulls down to battery voltage,but the battery current (I_{Bat}) can not increase when Input voltage (V_{Mpp}) drops to Battery voltage (V_{Bat}).Assuming that the loss is ignored,input current (I_{PV}) is equal to battery current (I_{Bat}).let us see the following formula:

Solar Input power= Input voltage (V_{Mpp}) *input current (I_{PV})

Power into battery=Battery voltage (V_{Bat}) *battery current (I_{Bat})

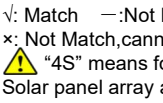
Normally, the V_{Mpp} is always higher than V_{Bat},But the I_{Bat} is always equal to I_{PV}.so Solar input power is greater than Power into battery.The greater the discrepancy between V_{Mpp} &V_{Bat}, the greater the loss.If the V_{Mpp} is lower than V_{Bat} .it cannot be charged.Therefore, we require the solar system using PWM controller, nominal voltage of solar array must match the battery bank.The below table is for reference

Battery Rated Voltage	PV Module							Controller Rated Voltage
	36 cell Voc < 23V			72 cell Voc < 46V		60 cell Voc < 38V		
	1S	2S	4S	1S	2S	1S	2S	
12V	√	—	—	—	—	—	—	12V
24V	×	√	—	√	—	√	—	24V
48V	×	×	√	×	√	×	√	48V

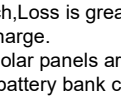
√: Match —:Not Match,Loss is great,please use MPPT controller instead
×: Not Match,cannot charge.

⚠ “4S” means four solar panels are connected in series, and so on

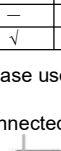
Solar panel array and battery bank can change the voltage of the whole array and bank in series and parallel,
The followings are several common series parallel modes for reference



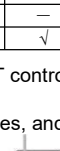
2x12V to 12V parallel



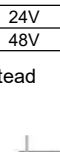
2x12V to 24V series



4x12V to 12V parallel



4x12V to 48V series



4x12V to 24V series/parallel

5.Wiring

Step 1: choose the installation site

Do not install the controller at a place that is subject to direct sunlight, high temperature or water intrusion, and make sure the ambient environment is well ventilated.

Step 2: Place the controller at a proper position, use a screw driver to fit screws in mounting hole.

⚠**CAUTION:** If the controller is to be installed in an enclosed box, it is important to ensure reliable heat dissipation through the box.

Step 3: Wiring

Connect the system in the order of ❶battery (after connected the battery,the LCD will be on. If LCD not on, stop connecting,and check whether the positive and negative poles are reversely connected.Only after the LCD displays, you can continue to the next step.Always connect the battery first, in order to allow the controller to recognize the system voltage)❷ PV array ❸load and disconnect the system in the reverse order❸❷❶.

⚠**CAUTION:** ①**If an inverter is to be connected to the system, connect the inverter directly to the battery, not to the load side of the controller**.

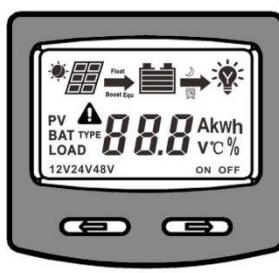
②The battery fuse should be installed as close to battery as possible. The suggested distance is within 150mm.

③The OD series is a positive ground controller. Any positive connection of solar, load or battery can be earth grounded as required.

④If possible,Please add breakers to solar,battery and load

⑤when the controller is in normal charging state, disconnecting the battery will have some negative effect on the DC loads, and in extreme cases, the loads may get damaged.

6.Operation



6.1 Button

Mode	Note
Load ON/OFF	In load manual mode, it can turn the load On/Off via the “OPERATION” button(→)
Clear Fault	Press the “OPERATION” button(→)
Browsing Mode	Press the “MENU” button(←).
Setting Mode	Press the “MENU” button. and hold on 5s to enter the setting mode Press the “OPERATION” button. to set the parameters, Press the “MENU” button. to confirm the setting parameters or no operation for 10s, it will exit the setting interface automatically.

6.2 Interface

(1) Status Description

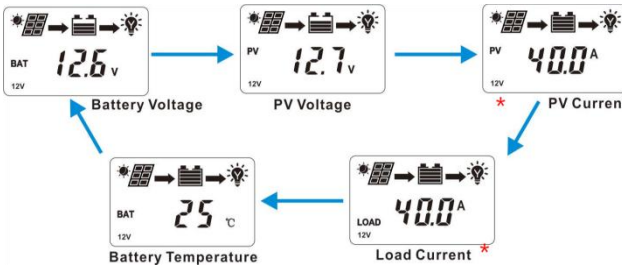
Item	Icon	Status
PV array		In daytime and PV connected correctly
		At night or no PV connect or reverse connect
		No Charging
		In Float Charging Mode
		In Boost Charging Mode
	PV	PV Voltage, Current and Power
Battery		Battery Capacity Indicating
	12V24V48V	Current System Voltage
	BAT	Battery Voltage and Current
	BAT TYPE	Battery Type
Load		Load ON
		Load OFF
		Light and Time Control Mode
		Light Control Mode
	LOAD TYPE	Load Working Mode
	LOAD	Discharging Current and Work Status

(2) Fault Indication

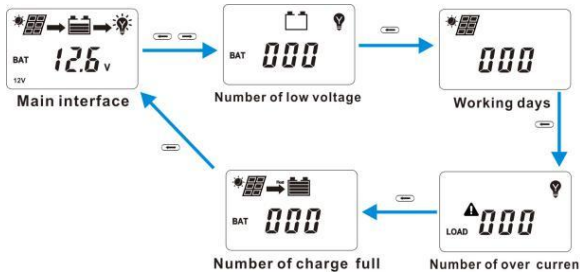
Status	Icon	Description
Battery over discharged		Battery level shows empty, battery frame blink, fault icon blink
Battery over voltage		Battery level shows full, battery frame blink, fault icon blink
Controller over temperature		Temp.icon shows Temp.inside controller is higher than 75℃, temperature icon blink, fault icon blink
Load failure		Load overload① ,Load short circuit
PV over voltage		It shows PV voltage is higher than rated PV open voltage.PV icon blink,fault icon blink

(3) Browse interface

①If there is no operation within 20s in any interface or after powered on within 10s, The main interface will cycle to display the battery voltage,PV voltage,charging current,discharging current and battery temperature every 3s.Long press the “MENU” button (←) can speed up the cycle display time.

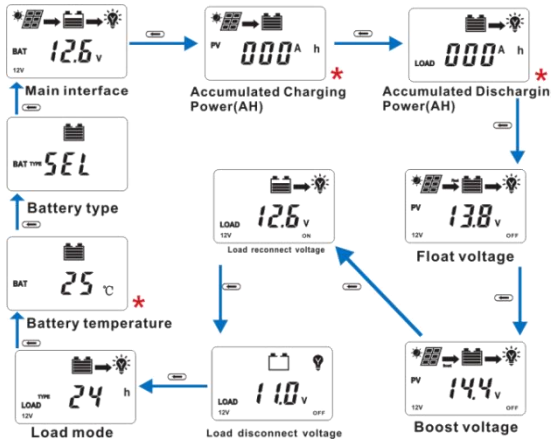


②At main interface(cycle display),long press menu and operation button at same time to enter working record status,it can show times of low voltage,working days,times of over current and times of full charging



③At main interface(cycle display),Press the “MENU” button(←) and enter

menu interface



⚠ The interfaces marked "*" are not equipped for SD2410C,SD2420C and SD2430C.

6.3 Setting

(1) Clear the charging power and discharging power(AH)

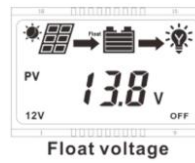
Operation:

Step 1: Press the "**MENU**" button and hold for 5s under the PV generated charging power interface and the value will be cleared.

Step 2: Press the "**MENU**" button and hold for 5s under the PV generated discharging power interface and the value will be cleared

(2) Float Voltage Setting

Operation:



Step 1: At main interface(cycle display),Press the "MENU" button to enter float voltage interface

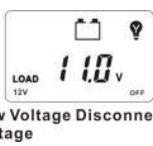
Step 2: Long press the "MENU" button(≥5S) until the value is flashing,then it enters the setting state.

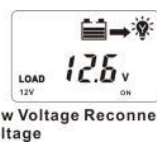
Step 3: Press the "MENU" and "OPERATION" button to change the value

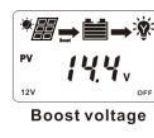
Step 4: After setting,Long press the "MENU" button(≥5S) to save the new setting.If there is no operation within 20s,the controller will enter the main interface and cycle to display automatically.

(3) Setting of boost voltage, low voltage reconnect voltage and low voltage disconnect voltage

Operation:At main interface(cycle display),Press the "MENU" button to enter the relevant interface below:







The operation method of setting is the same as float voltage setting,Please refer to the above"2)"

- **The following rules must be observed when modifying the parameter values in User**

Ⅰ.Charging Limit Voltage >Boost Charging Voltage >Float Charging Voltage > Boost Reconnect Charging Voltage.

Ⅱ.Low Voltage Reconnect Voltage > Low Voltage Disconnect Voltage(BMS+0.2V)

Ⅲ. Boost Reconnect Charging voltage > Low Voltage Reconnect Voltage> Low Voltage Disconnect Voltage(BMS+0.2V)

- **Battery Voltage Control Parameters**

Below parameters are in 12V system at 25 ºC, please double the values in 24V system

Battery Type	SEL 24V*2	GEL 24V*2	FLD 24V*2	LIF(LiFePO44S/12V 8S/24V*2)	LI3 (Li(NiCoMn)O2 3S/12V 6S/24V*2)
Over Voltage Disconnect	16.0V	16.0 V	16.0 V	16.0V	17.5 V
Charging Limited Voltage	15.0 V	15.0 V	15.0 V	14.8V	17.0 V
Over Voltage Reconnect	15.0 V	15.0 V	15.0 V	14.8V	17.0 V
Boost charge	14.4 V	14.2 V	14.6 V	14.6V	12.6V
Float charge	13.8 V	13.8 V	13.8 V	14.4V	12.4V
Boost Restart Voltage	12.6V	12.6V	12.6V	13.0V	11.5V
Low voltage reconnect	12.6V	12.6V	12.6V	12.6V	11.0V
Low voltage disconnect	11.0V	11.0V	11.0V	10.5V	9.2V

(4) Load Working Mode

The default working mode of the controller is 24 hours,which means that as

long as the battery has enough energy, the controller can supply power to the load continuously.

Operation:

Step 1: At main interface(cycle display),Press the “MENU” button to enter load mode interface.

Step 2: Long press the “MENU” button(≥5S) until the 24H is flashing,then it enters the setting state.

Step 3: Press the “MENU” and “OPERATION” button to change the value

Step 4: After setting,Long press the “MENU” button(≥5S) to save the new setting.If there is no operation within 20s,the controller will enter the main interface and cycle to display automatically.

Hours	Light and Timer Control
24H	Load will always be on
1H	Load will be on for 1 hour after sunset
2H	Load will be on for 2 hours after sunset
3H~14H	Load will be on for 3 ～ 13 hours after sunset
14H~23H	Load will be on after sunset and be off before sunrise.

(5) Battery type

①support battery types

Lead-acid battery	Sealed(default)/Gel/Flooded/User
Lithium battery	LiFePO4(LF4/12V;LF8/24V;
	Li(NiCoMn)O2 (LI3/12V;LI7/24V;

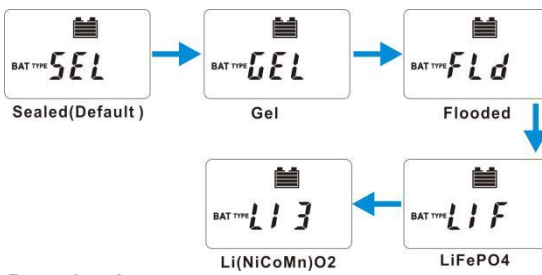
②Setting the battery type via LCD

Step 1: At main interface(cycle display),Press the “MENU” button to enter battery type mode interface.

Step 2: Long press the “MENU” button(≥5S) until the “SEL” is flashing,then it enters the setting state.

Step 3: Press the “MENU” and “OPERATION” button to confirm the battery type below:

Step 4: Long press the “MENU” button(≥5S) to save the new setting.If there is no operation within 20s,the controller will enter the main interface and cycle to display automatically.



6.4 App Download

iConnect App can provide 24-hour online videos about product installation, operation and troubleshooting And can also provide professional system design for free.Therefore, we strongly recommend that you download and use it.

① Android/Harmony System

Method 1: Scan the following QR code with your mobile browser and enter the App download page. Click the latest version of the download file directly, and then install it directly (if prompted during the installation process, please select "Trust" and "Allow" to continue the installation. Harmony system should not turn on pure mode)

Method 2: The mobile phone browser can be downloaded and installed directly by logging in to **https://www.ldsolarpv.com/jszc#** or **https://www.ldsolar.com/download**.

Method 3: Google Play application market download

Search for "LD iConnect" in Google Play Application market and find ldsolar's app. The icon is as follows. Just download and install it directly.

②IOS for Apple

Search for "LD iConnect" in the Apple iTunes, and find ldsolar's app, with the icon above, just download and install it directly.

Note: After downloading the App, please check the application update in My iConnect -- click Automatic Update to the latest version. In this way, you can enjoy the latest application functions.

③How to use App?

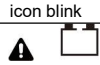
Please refer to the instruction manual of iConnect app for details.Scan the QR code or download from the iConnect App

7. Protections, Troubleshooting and Maintenance

7.1 Protection

PV Short Circuit	When not in PV charging state, the controller will not be damaged in case of a short-circuiting in the PV array.
PV Reverse Polarity	When the polarity of the PV array is reversed, the controller may not be damaged and can continue to operate normally after the polarity is corrected.
Night Reverse Charging	Prevents the battery from discharging through the PV module at night.
Battery Reverse Polarity	Fully protected against battery reverse polarity; no damage will occur for the battery. Correct the wrong wiring to resume normal operation. **NOTE: Limited to the characteristic of lithium battery, when the PV connection is correct and battery connection reversed, the controller will be damaged.**
Battery Over Voltage	When the battery voltage reaches the over voltage disconnect voltage, it will automatically stop battery charging to prevent battery damage caused by over-charging.
Battery Over Discharge	When the battery voltage reaches the low voltage disconnect voltage, it will automatically stop battery discharging to prevent battery damage caused by over-discharging. (Any controller connected loads will be disconnected. Loads directly connected to the battery will not be affected and may continue to discharge the battery.)
Load Short Circuit	When the load is short circuited (The short circuit current is ≥ 2 times the rated controller load current), the controller will automatically cut off the output. The controller will reconnect the output automatically every 30s to judge whether the short circuit is relieved , it needs to be cleared by pressing the operation button or restarting the controller.
Load Overload	When the load is overloading (The overload current is ≥ 1.1 times the rated load current), the controller will automatically cut off the output. If the load reconnects automatically every 30s, it needs to be cleared by pressing the Load button restarting the controller or restarting the controller.
Controller Overheating	The controller is able to detect the temperature inside the controller. The controller stops working when its temperature exceeds 85 °C and restart to work when its temperature is below 65 °C. **NOTE:This function is not equipped for SD2410C,SD2420C and SD2430C.**

7.2 Troubleshooting

Possible reasons	Faults	Troubleshooting
PV array disconnection	LCD display during daytime 	Confirm that PV wire connections are correct and tight.
Battery voltage is lower than 8V	Wire connection is correct, the controller is not working.	Please check the voltage of battery. At least 8V voltage to activate the controller.
Battery over voltage	 Battery level shows full, battery frame blink, fault icon blink	Check if battery voltage is higher than OVD(over voltage disconnect voltage), and disconnect the PV.
Battery over discharged	 Battery level shows empty ,battery frame n blink	When the battery voltage is restored to or above LVR(low voltage reconnect voltage), the load will recover
Load Overload	 1. The load is no output 2.Load and fault icon blink	①Please reduce the number of electric equipment. ②Restart the controller.
Load Short Circuit		①Check carefully loads connection, clear the fault. ②Restart the controller.

7.3 Maintenance

The following inspections and maintenance tasks are recommended at least two times per year for best performance.

- Make sure controller firmly installed in a clean and dry ambient.
- Make sure no block on air-flow around the controller. Clear up any dirt and fragments on radiator.
- Tighten all the terminals. Inspect for loose, broken, or burnt wire connections.
- Confirm that all the terminals have no corrosion, insulation damaged, high temperature or burnt/discolored sign, tighten terminal screws to the suggested torque.
- Check for dirt, nesting insects and corrosion. If so, clear up in time.

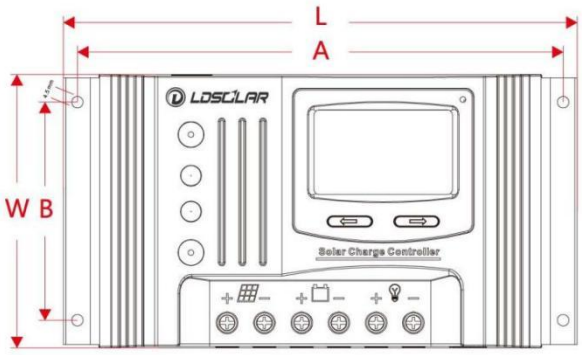
8. Technical Specifications

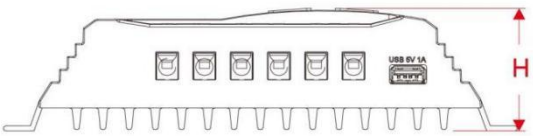
8.1 Electrical Parameters

Model	SD24**10C/20C/30S/40S/50S/60S	SD48**30S/40S/50S/60S
System Voltage	12V/24V	24V/48V
PV Max Input Voltage	55V	100V
Self-consumption	<10mA	
Max Charging current	10A/20A/30A/40A/50A/60A	30A/40A/50A/60A
Max Discharging	10A/20A/30A/40A/50A/60A	30A/40A/50A/60A
Battery Type	Sealed(Default)/Gel/Flooded/LiFePO4/ Li(NiCoMn)O2/ User	
LVD	11.0V ADJ 9V...12V ; x2/24V ; x4/48V	
LVR	12.6V ADJ 11V...13.5V ； x2/24V ; x4/48V	
Float Voltage	13.8V ADJ 13V... 15V ; x2/24V ; x4/48V	
Boost Voltage	14.4V ADJ 13V...17V ； x2/24 ; x4/48V battery voltage less than 12.6v auto boost 2hours	
Battery Over Voltage Protection	16.5V ; x2/24V ; x4/48V	
Reverse Connection	√	
Load Over Current	Yes, each 30s auto restart again	
Controller Over	√	
Charging Type	PWM	
Temperature	-24 mV /°C for 12Vsystem ; x2/24V ; x4/48V	
Working Temperature	-20°C—+55°C	
Waterproof grade	IP32	

8.2 Mechanical Parameters

Charging current	10A	20A	30A	40A	50A	60A
Size (LxWx H)mm	165x120x39		200*98*47.5	200*106*41	190x145x55	190x145x56
Mounting holes(AxB)mm	84x134		111x124	111x124	128x124	128x124
Weight (g)	225	350	440	480	690	780
Terminal scale	10mm²		16mm²	16mm²	25mm²	25mm²





Any changes without prior notice

Version:V2.1