

SOLARKING

SK-10

Solar Charge Controller User Manual



12V/24V 10Amp

Dear Users:

Thank you for selecting our product. Please read this manual carefully before you use this product.

This product is of cutting edge design, with full digital technology and LCD display, auto run mode with large applications range, such as off-grid solar home system, camping solar system, solar street lights, solar garden lights and so on. The intelligent charging process has been optimized for long battery life and improved system performance.

Features

- ❖ 32bits CPU, sampling speed is higher, operation is faster
- ❖ 12V/24VDC Automatic Identification System Voltage
- ❖ MPPT Technology
- ❖ Sealed, Gel, Flooded battery selection procedure
- ❖ Dynamic display operation and working data.
- ❖ Built-in operation log
- ❖ Multi load control mode: Normal mode, Sensor mode, Timer mode
- ❖ Temperature Compensation Function
- ❖ Protection from short circuit and reverse polarity
- ❖ Max 10mm² connectors
- ❖ 5V 1A USB output

Important Safety Information

- ❖ It is better to install controller inside. If installing the controller outside, please keep the environment dry, avoid direct sunlight. Rear of the solar panel is accepted.
- ❖ The controller will be hot when in operation, please keep the environment ventilated and away from flammable materials.
- ❖ The Voc of solar panels is high (especially 24V) , please take care
- ❖ Your battery will have acidic electrolysis, please put on goggles during installation. If you accidentally exposed to electrolysis, please rinse with water.

- ❖ The battery has huge power, prohibit any short circuit between the positive and negative pole of battery. Suggest adding a fuse between battery and controller. (Slow motion type, the current of the fuse should be 1.5 times rated current of controller.)

Tips for Use

- ★ The controller can detect the temperature of environment to adjust the voltage of charging, so that the controller should be as close to the battery as possible.
- ★ Recommend system current density of cables no less than $3A/mm^2$
- ★ Try to use multi strand copper wire in order to connecting with the terminal firmly. Loose power connection and/or corroded wires may result in resistive connections that melt wire insulation, burning surrounding materials or even cause fire.
- ★ The batteries should be regularly charged to keep the battery in good working order.



Installation of Instructions

■ Controller Fixed

- 1) The controller should be installed well-ventilated place, avoid direct sunlight, high temperature and do not install in location where water can enter the controller. You can also mount on the rear of the solar panel.
- 2) Please select correct screw to fix the controller on the wall or other platform. Screw M4 or M5, Screw cap diameter less than 10mm.
- 3) Please reserve enough space between the wall and controller, to allow for cooling and cable connection.

- 4) The mounting holes distance is 155.8mm*63mm, diameter of the hole is 5mm

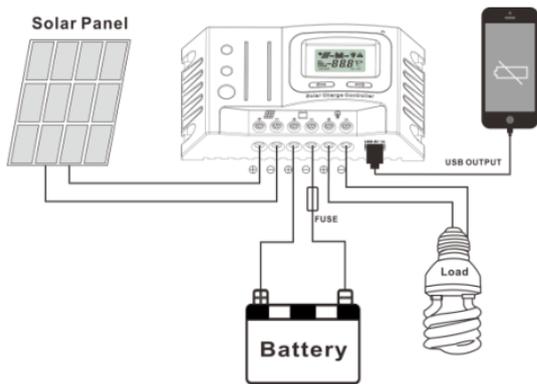


■ Controller Connection

- ★ All terminals are in pre-tightened status, in order to be well connected, please loosen all terminals first.
- ★ The following order of connection please do not free change, or cause system voltage recognition fault.

In order to avoid fault installation, please refer to below procedure

- 1) As figure, first connected the battery to controller correct poles. In order to avoid short circuit, please screw the cable of battery to the controller in advance, then connected to battery poles secondly. If your connection is correct, the LCD displaying will show battery voltage and other technical data. If LCD is not displaying, please check the fault. The length of cable between battery and controller as shorter as possible. Suggest to 30CM -100CM.
- **If short circuit happens on the terminals of controller, it will be result in fire or explode. Please be careful. (We strongly suggest to connecting a fuse at the battery side 1.5 times of rated current of controller.)**
 - **If the battery reverse connection, the output of controller we be the same with battery polarity, please do not connect any load with controller at that time, or the load on the controller will be damaged.**



- 2) As above, connect solar panels to controller correctly, if the connection is successful and the sun is out, the LCD will show solar panel and an arrow from solar panel to battery will be lit.

Warning: The solar panel will generate very high voltage under sunshine.



- 3) As above, connect loads to controller correctly. In order to avoiding damage to your load device. Press the load off button first to turn off load when connecting the load.

Attention: If users want to connect the controller to an inverter or high current drawing device please connect these items directly to the battery not the load terminals.

- 4) USB output: The USB offers 5V Max with a max charging current 1000 mA for Mobile, Laptop, MP3 and so on.

■ About ground connection of solar system

Please noted, this solar charge controller designed for all positive connection, all components inside the controller are positive. If your solar system needs ground connection, please use



positive ground connection.

Warning: For some force to ground connected systems, such as solar communication system, portable solar system, they are negative ground connected, at this time please do not positive connect, or this can cause short circuit.

Main Interface

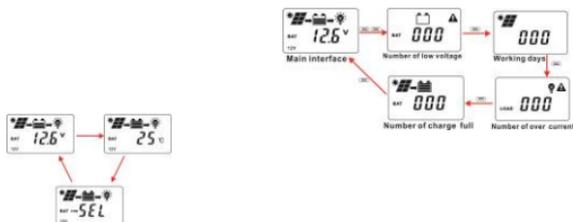
Name	Symbol	Indicate function
Solar Panel		Correct connect solar panel and sun is out
		Not connected solar panel or wrong connection or no sun
		charging
		Not charging
	PV	data about charging
Battery		Battery capacity indicator
	12V24V	System Voltage

	BAT BAT TYPE	Data about battery Battery type
Load		Load on
		Load off
	LOAD	Data about Load
	LOAD TYPE LOAD	Load working type

Operation and Indication of controller

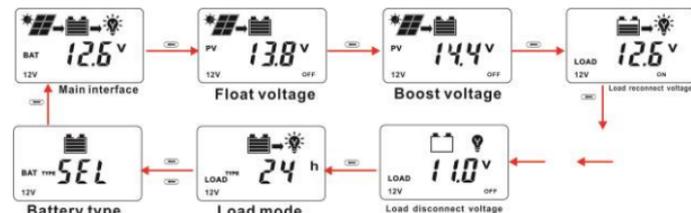
➤ Main Interface

- ❖ If no operation at main interface within 10s, the main interface will show battery voltage, temperature of environment, battery type, each parameter keep 3s. Long press "→" could speed loop display.
- ❖ At main interface short press "→" turn on or off load.
- ❖ At main interface, long press "←" and "→" together 5s could show operation log, such as times of LVD, working days, times of Over



current protection, times of HVD

➤ At main interface press "←" button to enter menu interface



- 1) Float voltage: When the voltage of battery reaches to this set point, the controller will start float charging function, limited voltage to stop battery rising, keep the battery in full condition. Press "←" button enter into menu interface of float voltage. Long press "←" button $\geq 5S$ the parameter on the interface will be flash, here is set up state. Use the button, press "←" or "→" could plus or minus the data. After confirm the needed data, long press "←" $\geq 5S$, the data will save and come out set up state. If no functions are selected within 20s, automatically back to main interface.
- 2) Boost Voltage: When the battery voltage is less than 12.6V, the controller will auto reach to 14.4V before returning to float charge after a small break..
- 3) Low Voltage Reconnection Voltage (LVR): When the controller detected it will close the output of load. If the controller re-connects the output, the voltage of battery must be higher than the min voltage or press "→" at main interface to turn back on. The procedure is same with (1).
- 4) Low Voltage Disconnection Voltage (LVD): When the voltage of battery is low, the load output will be cut off. When the controller

detected the battery voltage was less than LVD point, the cut off function will be immediately working. At the same time, the status of controller is in lock. Users have to charge the battery, when the battery voltage is higher than LVD voltage or press “→” at main interface force back on. The procedure is same with (1)

- 5) Load Working Mode Selection: The control default load working 24hours. When the Load Working Time set to 24hours, the load will keep working 24hours in no fault status. When the load working time set to $\leq 23H$, it means the load start timer or sensor function. If the battery capacity is enough, the load will be started at sunset. The load will work under timer setting hours or stop working till sunrise.



When the load is joined to timer or sensor mode, if the default working time more than actual night time, the load output will be closed at sunrise, although the working time has not been reached. For example, the local actual night time is 10hours, user reset the working time at night is 12hours, but 10hours later the output will be closed automatically, the balance hours will be back to zero. The load will be working with next sunset signal.

- 6) Battery Type Selection: Built-in 3 types battery data. Different battery will use different parameter. (Default SEL battery parameter)

Battery Type	SEL	GEL	FLD
Over Voltage Protection	16.5V	16.5 V	16.5 V
Charging Limited Voltage Max	15.0 V	15.0 V	15.0 V
Over Voltage Protection reconnection Voltage	15.0 V	15.0 V	15.0 V
Boost	14.4 V	14.2 V	14.6 V
Float	13.8 V	13.8 V	13.8 V
LVR	12.6V	12.6V	12.6V

Attention: About the control parameters of the battery, We have set to standard working conditions, if customers want to adjust the parameters, please refer to battery supplier suggestion.



Protection Functions

❖ Fault Symbol Indication

State	Symbol	Description
LVD		Battery empty and Warning Flashing
HVD		Battery full and Warning Flashing
Over current protection		Load and Warning Flashing

❖ Short Circuit and Reverse Connected Protection (Solar Panel)

When the solar panels have short circuit or reverse connection, the controller will be stop the charging immediately, after clearing the short circuit, the charging will then automatically continue.

❖ Reverse Connection of battery Protection

If the battery has reverse connection, the controller will stop until, connection is corrected, the controller will then start working.

❖ Battery Over Voltage Protection

When the voltage of battery was more than 16.5V, the controller will stop charging and output in order to not destroy the battery and loads.

❖ Battery Low Voltage Protection (LVD)

When the voltage of battery reaches to LVD (Low Voltage Disconnection) point, the controller will auto close the output in order to not over-discharge the battery.

❖ Overload Protection

If the current of load is more than 1.5 times rated current of controller, the controller will cut off the output after 30s and lock. Users have to decrease loads and press “→” unlock, or 30s later the controller will auto restart and unlock.

❖ Short Circuit Protection

When the load has short circuit, the controller will be cut off immediately and lock. Users have to clear the short circuit and press “→” unlock, or 30s later the controller will auto restart and unlock.

❖ Lightning Protection

This product could only protect small lightning induction, we suggest to use lightning rod in high lightning area.

Fault and Handling

Fault Description	Possible reason	Solution
LCD no display after connected with battery	<ul style="list-style-type: none"> ● Battery Low ● Battery Reverse Connection ● The connection cut off 	Please confirm the voltage of battery reconnect the controller with battery firmly and correctly.
Full sunshine on solar panel, no solar symbol and no charge symbol on LCD.	The solar panel connection open circuit, short circuit, or reverse connected	Please check the cable of solar panels if they are correctly connected.

The controller displaying LVD	The battery is over discharging	Please check the system design is correct. is there discharging capacity more than charging
The controller displaying HVD	The voltage of battery is high	Please first cut off the solar panel and see if the voltage goes down to normal level. If the fault does not stop, please cut off the battery with controller and reconnect again
The controller displaying Over Current Protection	The load is short circuit, or over load or high surge power	Please check if the load cables have short circuit, or the load is over rated design.

Technical Data

Mode	SK-10		
System Voltage	12V/24V		
PV Max Input Voltage	55V		
Self-consumption	≤12mA		
Max Charge Current	10A		
Max Discharge Current	10A		
LVD	11.0V ADJ 9V....12V; ×2/24V		
LVR	12.6V ADJ 11V....13.5V; ×2/24V		

Float	13.8V ADJ 13V....15V; ×2/24V
Boost Voltage	14.4V ; ×2/24 battery voltage less than 12.6v auto boost 2hours
Battery Over Voltage Disconnection Voltage	16.5V ; ×2/24V
Reverse Connection Protection	Yes
Load Over Current Protection	Yes, each 30s auto restart again
Charge Type	MPPT
Temperature Compensation	-24 mV /°C for 12Vsystem ; ×2/24V;
Working Temperature	-20°C---+55°C
Terminal scale	14---6 AWG 16mm ²
Waterproof grade	IP32
Size	165mm×90 mm×35mm
New weight	350g

Version number: V2