# SMART SOLAR CHARGING CONTROLLER

## USER MANUAL

Dear Users:
Thanks for choosing our product. Please read this Manual carefully prior to using this product.
The controller is used for off-network solar system to control the charging and discharging of battery.
Its main function is to protect battery. The smart charging process has been optimized for the purpose of extending service life of battery, which has improved system performance.

## 1 Main Function

The functions are as below:
▶Solar panels can provide power for USB device separately.
▶Humanized liquid-crystal display, human-computer interface is equipped with double-button for operation.
▶Complete technical data of installation and modification.
▶High-efficiency smart three-gradation charge with pulse width modulation.
▶Control mode of load is optional with a timing function of street lamp at night and manual discharging control.
▶Display the charging and discharging current.
▶Reliable over-voltage protection, short-circuit protection, over-load protection, over-charge protection and over-discharge protection.
▶Precise temperature compensation with a automatic calibration of charging and discharging voltage.
▶Improve the service life of battery.
▶Comprehensive reverse connection protection.

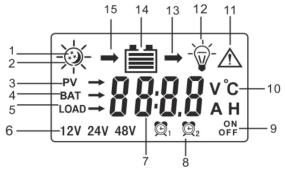
## 2 Important Information

▶Please install the controller indoors.
If the controller is installed outdoors, please keep the environment dry and avoid a direct sunlight.
▶In case that the controller will emit heat in the course of working, please keep the environment ventilated and stay away from inflammable materials.
▶Please take care when the open-circuit voltage of solar battery panel is high.
▶Please install the battery upright due to the fact this battery has acidic electrolysis.
Please wash with water in case of accidentally contacting with electrolysis.
▶Please avoid reverse connection or short-circuit connection under 48V system, or which may cause damage to product.
▶It is prohibited to cause the positive and negative short circuit by any conductor due to the batter power is large.
It is recommended to install safety fuse between battery and controller. (Slow-action type.
The safety fuse of action current should be 1.5 times greater than the current rating of the controller.)

## 3 Use Recommendation

▶The controller can regulate charging voltage through detecting the environmental temperature, thus try to keep t controller close to battery.
▶It is recommended to use the cables with the electric current density of system less than 3A/mm2.
▶Warning loose cables or the connection of corrosive cables may cause melting of the wire insulation due to an increasing resistance, which may burn surrounding materials and even cause a fire.
▶Please fully charge the battery every month, otherwise the battery will be damaged.

## 4 Feature of Liquid Crystal Graphic Display




1. Night indication of controller: If the input voltage of solar battery panel is identified by controller as lower than the photovoltaic starting value, this graphic symbol will be displayed.
2. Daily indication of controller: If the input voltage of solar battery panel is identified by controller as higher than the photovoltaic starting value, this graphic symbol will be displayed.
3. Parameter indication of photovoltaic panel: This graphic symbol will be lightened when displaying the data of solar battery panel. For example, the voltage of solar battery panel.
4. Battery parameter indication: This graphic symbol will be displayed when indicating the battery parameter, e.g. battery voltage, battery temperature etc.
5. Load parameter indication: This graphic symbol will be displayed when indicating the load parameter, e.g. discharging current, discharging timing etc.
6. System voltage: The controller will automatically regulate technical data when LCD displaying different system voltages.
7. Digital display area.
8. Timer setup function.
9. Graphic symbol of switch.
10. Unit symbol value.
11. Warning: This graphic symbol will be displayed when appearing failure.
12. Load status indicator: turn on , turn off .
13 Output power indicator: This graphic symbol will be displayed when outputting power.
14 Battery capacity indicator: Battery bar may vary when the battery capacity is different.
15 Charging status indicator: This graphic symbol will be displayed in case of charging controller. This graphic symbol will not be displayed if not charging.

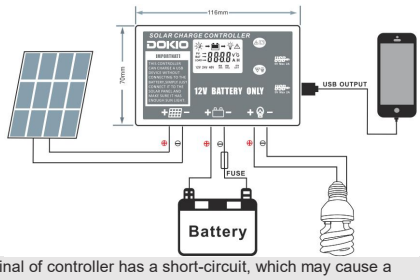
## 5.Installation

### 5.1Fastening of Controller

The controller should be installed in a place with a good ventilation.
Avoid direct sunlight and high temperature.
Please don't install the controller in a place where water may enter.

### 5.2 Controller Connection

As shown in Figure, please connect the battery on binding post of controller. Please fasten the cable of battery on controller in advance prior to connecting on binding post of battery to avoid short-circuit. LCD display will indicate the battery voltage and other technical data in case of correct connection. Please check any failure in case of no LCD display. The cable length between battery and controller should be as short as possible, it is recommended from 30cm to 100cm.
Connect the cables of controller and battery prior to connecting the cable of solar photovoltaic panel.
Please pay attention to the polarity of solar panel.




If the terminal of controller has a short-circuit, which may cause a fire or explosion. Please take care. (We strongly recommend to install the safety fuse for connecting battery: 1.5 times as much as rated current of controller)

▶As shown in Figure, LED will display the solar battery panel in case of sufficient sunlight and correct connection between solar battery panel and controller. The arrow from solar battery panel to battery panel will be displayed.

The voltage of solar battery panel is high, please connect the controller of solar battery panel correctly.
Under 24V system, the reverse connection of solar panel may cause damage to solar charging controller.
In order to avoid injury of load voltage, please turn off the output of controller by pressing button prior to connecting the load to controller.
Please take care due to the controller doesn't provide reverse connection protection of load.

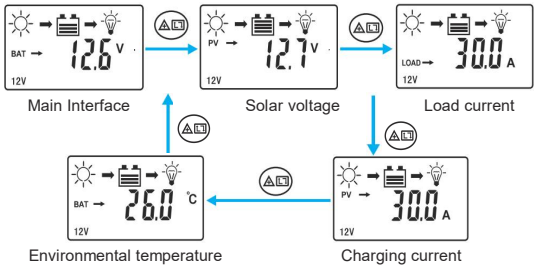
▶Grounding of solar battery panel
Please note that this solar charging controller is designed to have a common positive connection with the positive electrodes of all components are assembled together. If your solar system needs to be grounded, please connect the positive grounding.

Warning: In terms of some grounding systems, e.g. solar communication system, portable solar system etc., their negative grounding has been connected.
Please don't connect the positive grounding, otherwise it may cause a short-circuit.

## 6 Operation and Display (Main Interface)

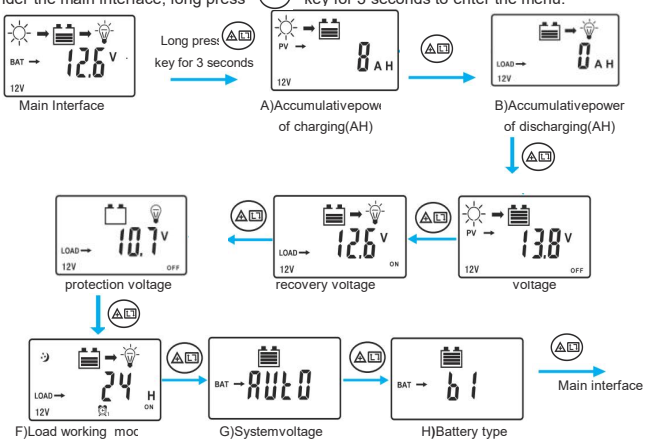
▶There is one-second initialization after turning on the controller, it will display the rated current prior to entering the main interface.


▶Under the main interface, press key to display the battery voltage, solar battery penal voltage, load current, charging current and environmental temperature.



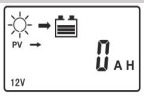

▶Under the main interface, press key to turn on or off the load output.


▶Under the main interface, long press key for 3 seconds to enter the menu.



## A)Accumulative charging power (AH)

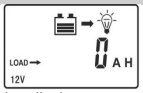
This parameter indicates the accumulative charging current value of solar battery panel. Please long press key for a minimum of 3seconds under this interface, and the timer will be reset.



Accumulative charging power (AH)

## B)Accumulative discharge power (AH)

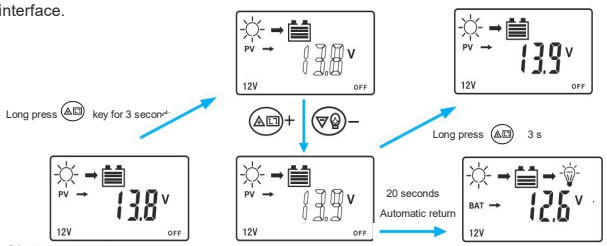
This parameter is the accumulative discharging current value. Please long press key for a minimum of 3 seconds under this interface, and the timer will be reset.



Accumulative discharge power (AH)

## C) Floatingvoltagesetup

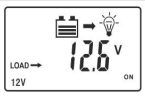
This parameter is the floating voltage. The controller will start function of pulse width modulation at this voltage point, which will limit the voltage rise. Long press key for 3 seconds under floating voltage interface, the number will flash, and it will enter the setup status. Release the button, press key for operation of adding data, and press key for operation of deducting data. Upon completing required technical data, long press key for 3 seconds, the parameter will be saved and the system will exit setup status. If there is no operation after 20 seconds, the system will automatically return to main interface.




C) Floating charge voltage

## D) Over-discharge recovery voltage

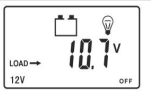
If the battery voltage is low, controller will stop providing power to load. If the controller needs to reconnect output, the battery voltage should be higher than the over-discharge voltage or press key to release compulsorily. Setting method is same as (C).



Over-discharge recovery voltage

## E) Discharge protection voltage

The load output will be cut off in case of low battery voltage. If the controller detects that the battery voltage is lower than discharge protection voltage, it will immediately cut off the load output. Meanwhile, the controller will be in a locking status. Users must charge the battery. The load recovers output if the battery voltage is higher than over-discharge recovery v Setting method is same as (C).

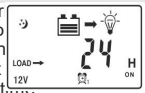


Over protection voltage

**In terms of C, D and E, the designers have a thorough consideration on the default data of these three parameters. According to the actual using status, users don't need to regulate. Please refer to the recommendations of battery suppliers, otherwise the battery may be damaged or have an irreparable destruction.**

## F) Load working mode selection

The controller's default working load is 24 hours. If the load wor time is set up as 24 hours, the load will work 24 hours under no failure status; If the working time is set up as no more than 23 h it indicate that the load starts timing function. The load will start sunset if the battery capacity is sufficient. It will work within the t set up by timer or stop working before sunrise. The setting methc is same as (C).

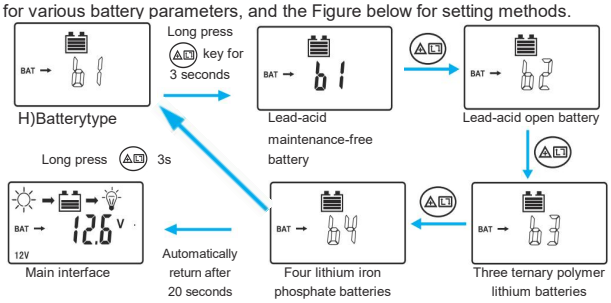


Load working mode

Under the load timing mode, if the setting working time is more than the actual night time. The load output will be automatically turned off in case of sunrise, even though the working time is short of setting time. For example, the actual local night time is 10 hours, users reset the night working time is 12 hours. The output will be automatically turned off upon 10 hours, and the timer will be reset. It will process the next sunset signal.

## H) Battery type selection

This controller will select the battery type applying to a wide voltage demand of users. The default type is B1 lead-acid maintenance-free battery. Users can select other battery types according to their needs. Please refer to the Table below for various battery parameters, and the Figure below for setting methods.



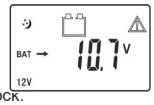

# 7 Battery Type and Parameter

| Battery Code | B1 | B2 | B3 | B4 |
|---|---|---|---|---|
| Battery Type | Lead-acid maintenance-free battery | Lead-acid open battery | Ternary polymer lithium battery | Lithium iron phosphate battery |
| Rated Voltage | | | 12V | |
| Booster Voltage | 14.4V | 14V | 12.6V | 14.4V |
| Floating Volatage (PV OFF ) | 13.7V | 13.7V | 12.6V | 14.4V |
| Discharge Protection Voltage (LOAD OFF ) | 10.7V | 10.7V | 8.4V | 10V |
| Discharge Recovery Voltage ( LOAD ON) | 12.6V | 12.6V | 10V | 11V |

# 8 Protection Function

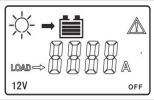
## ▶Battery low-voltage protection

If the battery voltage is lower than discharge protection voltage, the battery low-voltage protection will start. Output power is cut off, the battery symbol and warning light will flash. After recharging, the battery voltage is higher than discharge recovery voltage, the load will automatically recover output or press key to compulsorily unlock.



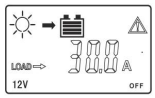
## ▶Overload short-circuit protection

The short-circuit protection will start in case of load short-circuit. Load is cut, and LOAD, 8888A, warning symbol will flash. Delay 30 seconds after removing the short-circuit failure, it will automatically recover load output.



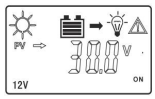
## ▶Load over-current protection

If the load current is 10 seconds higher than rated current, the over-current protection will start. Load is cut off, and LOAD, rated current value and warning symbol will flash. Delay 30 seconds after removing the over-current failure, it will automatically recover load output.



## ▶Solar panel over-voltage protection

When connecting the solar battery panel, the controller will judge whether the connected solar panel voltage is high according to the system voltage (Maximum voltage is 25V under 12V system, maximum voltage is 50V under 24V system maximum voltage is 100V under 48V system). If the solar voltage is high, this controller will not charge the battery. Meanwhile, solar voltage, solar symbol and warning symbol will flash.



# 9 Common Failure and Solution

| Failure | Possible Reason | Solution |
|---|---|---|
| LCD has no response after connecting with battery | ▶ Battery voltage is low<br>▶ Reverse connection of battery positive and negative anodes | Please confirm battery voltage<br>Reconnect with controller with battery |
| No solar symbol after connecting solar panel, LCD has no charging symbol | Solar battery panel has open circuit, short circuit or reverse connection of positive and negative anodes | Please check cable of solar battery panel. Please reconnect in case of correct connection |
| Controller indicates load short-circuit | Controller load output terminal may has a short circuit | Please check whether load has a short circuit, and reconnect the load |
| Controller indicates loa over-current protection | Load power exceeds rated power of controller or connects with inductive load | Please reconnect after reducing the load power |
| Controller indicates excessively high solar voltage | Open-circuit voltage of solar battery panel is excessively high | Please check open-circuit voltage of solar battery panel, replace with the appropriate solar battery panel, or regulate the system voltage to 12V, controller has no high-voltage protection |

# 10 Parameter Sheet

| Model | SC2430D 10 | SC2430D 20 | SC2430D 30 |
|---|---|---|---|
| Rated current | 10A | 20A | 30A |
| Rated voltage | 12V | | 24V |
| Maximum solar voltage | ＜25V(12V ) | ＜25V ( 50V) | |
| Low-voltage protection | 10.7/21.4V | | |
| Over-discharge recovery voltage | 12.6/25.2V | | |
| Floating voltage | 13.7/27.4V | | |
| Standby power loss | ＜30mA | | |
| Housing material | ABS+Aluminum | | |
| USB output | 5V 2A | | |
| Charging mode | PWM | | |
| Temperature compensation | -4mV/Cell/℃ | | |
| Working temperature | -20℃ ~ + 60 ℃ | | |