

**SSM20-40A Instruction for use of a step-down  
MPPT solar controller**

## SSM20-40A Instruction for use of a step-down MPPT solar controller

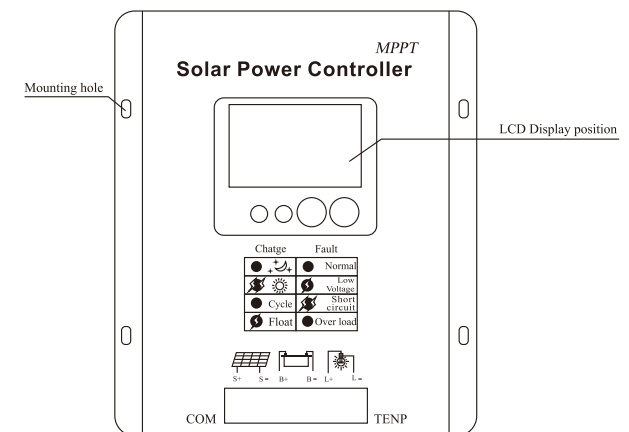
### Product overview:

The controller is suitable for the automatic control of charging and discharging process in the solar energy off grid system. The charging mode of the controller is divided into MPPT and DC-DC, and the discharge process of the battery is optimized, which can prolong the service life of the battery and improve the performance of the system. Its comprehensive electronic protection function can prevent the user from installing errors and system failures to make the controller damaged.

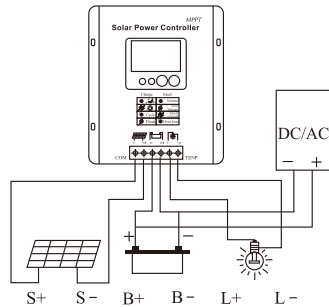
### Functional characteristics:

1. System voltage automatic identification
2. Design of high speed and high performance 32 bit processor
3. Excellent heat dissipation and EMC design
4. Using MPPT and PWM two charging mode, effectively improve the charging efficiency of the battery board.
5. The use of large screen LCD LCD display and dual key man-machine interface, complete menu display and operation
6. User-friendly browsing interface, user-friendly operation
7. Using power MOSFET as a switch, there is no mechanical switch
8. Intelligent battery power indicator to facilitate the user to view the status of the battery
9. Lead acid seals, colloids, openings and user selectable charging procedures
10. External temperature sensor with high precision temperature compensation
11. Parameter settings power down save function, no need to repeat settings, easy to use
12. With intuitive LED display, allowing users to understand the solar energy, the running state of the load
13. With over charge, over discharge, overload protection, and electronic short circuit protection and anti back protection of battery.
14. Lightning protection.

### Controller panel:

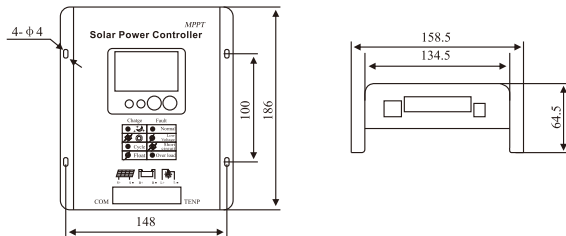


**Wiring diagram:**



**1. Installation and use of the controller**

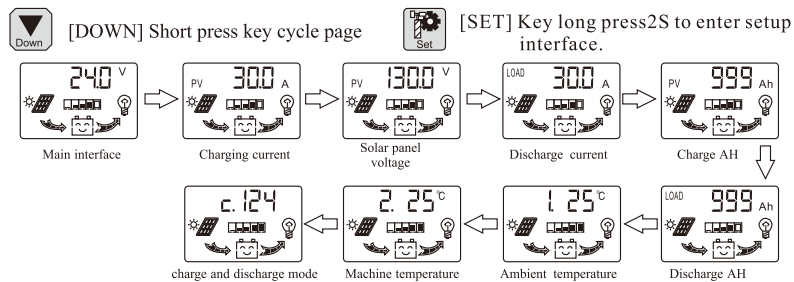
The controller must be installed with the following dimensions:  
SSM20A-40A Dimensions and mounting dimensions:



- Wire preparation: first determine the length of the wire, determine the installation position, as far as possible to reduce the length of the wire in order to reduce the power loss, the wire section according to the 4A/mm - to choose.
- first connect the battery, pay attention to positive and negative poles, do not reverse. If the connection is reversed, the controller indicator and the LCD screen do not have any indication but do not damage the internal components of the controller. If the connection is correct, the LCD has an initial display interface.
- connect the wire of the solar panel, pay attention to the positive and negative poles, do not reverse connection; if there is sunshine, CHARGE indicator light will be flashing after 5S or charging, or check the connection is not.
- At the end of is connected with the load, the LED source or load controller with the DC output positive and negative pole, note the negative, do not reverse, to avoid burning appliances.

**Display content and key functions:**

**1. Browsing parameter interface**



As shown in the above short press [DOWN] key page, in 1 minutes without operation button at any interface, will return to the main interface display.

The cumulative number of charge discharge ah: maximum 999KAh, more than the parameter value automatically to 0, the cumulative parameters of power down is not preserved, only to see the use of normal charging, and the load current is more than 0.5A, the number of AH to total discharge.

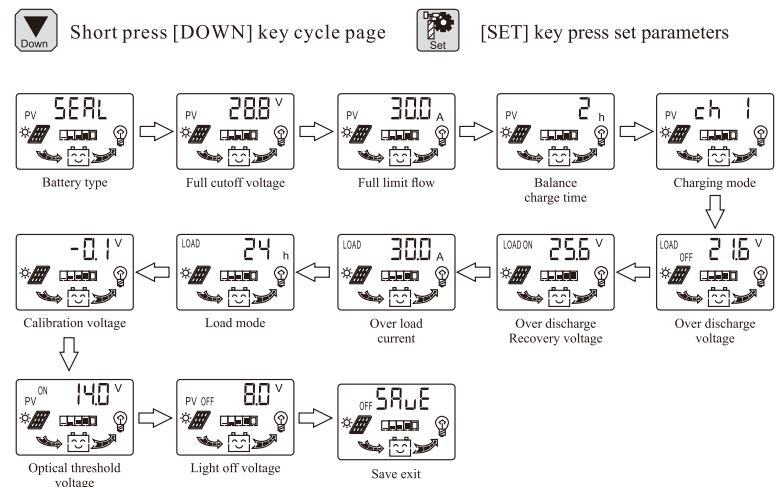
Ambient temperature: need to be connected to the temperature sensor. Charge and discharge mode interface description:

The first 2 for the charging mode code, the latter is the discharge mode code 2

c.1	MPPT MODE	0 - 24	0:Pure light
c.2	DCDC MODE		1-23:Street lamp timing
			24:Household

**2. Set parameter interface**

Click on the parameters of the interface long press [SET] key to enter the 2S settings interface.



**Battery type:**

- a. 5EAL Lead acid battery
- b. 6EL Gel Battery
- c. FLOO Open storage battery
- d. 5ELF Self setting battery charging parameters

Other set parameters (as SSM30A-12V):

Set items	Range	Remarks
Full cutoff voltage	13.0V - 15.0V	x2 (24V);
Charge limited current	10.0A - 40.0A	Default:30A

Set items	Range	Remarks
Balance charge time	1hour – 10hour	Default:1 hour
Charge mode	ch 1:MPPT ; ch 2:DCDC	Default:MPPT mode
Over discharge voltage	10.0V – 11.5V	x2 (24V);
Over discharge Recovery voltage	12.0 V – 13.5V	x2 (24V);
Overload current	10.0A – 60.0A	Set the current 1.5 times
Lode mode	0:Pure light 1 - 23:Street lamp timing 24:household	Default:24,household 1-23 means: Load output 1-23 hours
Calibration voltage	-2.0V – +2.0V	Calibrate battery voltage
Optical threshold voltage	3V – 10V	x2 (24V);
Light off voltage	3V – 10V	x2 (24V);
SAVE	Save parameters exit interface	

Be careful:

- 1) Full cut-off voltage: battery type is self - setting mode, parameter adjustment is effective
  - 2) Charging time: when the user equilibrium parameter set for lead-acid battery type, or when the battery charging opening colloid using three stage charging, battery balance or promotion parameters, after a certain time after charging to maintain, in order to enter the float. So the user can choose a reasonable charge to maintain the time to make the battery more full charge. (self setting parameter type, no charge holding time).
  - 3) An open said controller to open light mode, close the output light off; said controller closes the control mode, open output. The turn-on voltage is greater than the light light off voltage.
3. Restore factory default parameters



Any interface, the two keys at the same time (>10S), restore factory default settings parameters.

#### LCD Graphical symbol description:

Graphical	state	function
	off	At night or not connected to the solar panel
	Twinkle	Charging trouble
	on	During the day, the battery board access
	horse race lamp	solar plate charging
	Twinkle	Floating
	off	solar voltage is too low, not charging

Graphical	state	function
	on	At night or not connected to the solar panel
	off	day
	ON	normal
	on	Over current, over voltage or under voltage
	on	Battery power indicator
	horse race lamp	Battery power indicator
	off	No load or load failure
	on	Battery normal output
	Twinkle	Load failure
	off	Light or time
	on	Load in timing mode
	off	The work load in the household or pure lighting control mode

#### LED lamp instructions

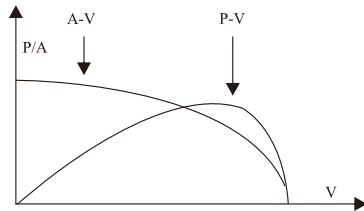
LED	state	function
CHARGE(green)	off	Night or battery board is not connected
	on	Battery charge state
	Slow Twinkle	Floating state battery
	Double Twinkle	Day state (no charge)
FAULT(red)	Fast Twinkle	The battery is charged, the voltage is too high
	Slow Twinkle	Load under pressure or high pressure protection
	Double Twinkle	short circuit protection
	on	overload protection
	off	Normal

**MPPT mode description:**

Due to the nonlinear characteristics of power generation of solar panels, there is a maximum energy output points on the curve (maximum power point), traditional controller (switch charging technology and PWM charging technology) can be maintained at this point for the storage battery, so it cannot get to the maximum energy cell board, but with the solar controller MPPT control technology can be traced to the time of the maximum power point array to obtain the maximum energy for battery charging.

The controller by comparing the MPPT algorithm to the adjacent point to determine the actual maximum power point panels, and keep the charge for the battery at the maximum power point tracking, the process is fully automated, the user does not need any adjustment.

The following figure is the solar cell volt ampere curve and power curve, it can be seen as the voltage increases, the current is always reduced.



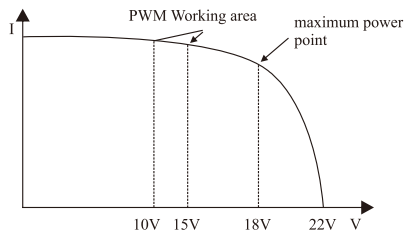
Under the assumption that the conversion efficiency of the system is 100%, the following formula is established:

Controller input power (PPV) = controller output power (PBat)

Derived from  $P=VI$ :

Input voltage (VMpp) \* input current (IPV) = battery voltage (VBat) \* charge current (IBat)

Under normal circumstances, the array of VMpp is always greater than VBat, because the principle of energy conservation, so IBat is always greater than IPV. If the greater the difference between VMpp and VBat, then the difference between IPV and IBat is bigger, the difference between the larger array and the battery will cause the system conversion efficiency is reduced, so the controller is particularly important in the conversion efficiency of photovoltaic system.



The maximum power point tracking curve of the controller, the PWM (voltammetry) work range of the traditional controller working range, in the figure we can clearly determine the use of MPPT technology can improve the effective rate of solar panels. According to the test, the MPPT controller can improve the utilization efficiency of solar panels by 20% ~ (due to the impact of the surrounding environment and the loss of energy, the specific value may be changed) than the PWM controller.

Open circuit voltage requirements for solar panels:

As solar panel types on the market vary, controller as the core component of PV system, which can be suitable for various types of solar panels and be able to maximize the solar energy into electrical energy is particularly important, therefore according to the photovoltaic power and solar panels provide the reference table below the open circuit voltage:

System voltage	Recommended solar panels open circuit voltage	
	Minimum	Maximum
12V	20V	100V
24V	40V	100V

Note: the maximum open circuit voltage of the solar panel is not more than 180V!

**Technical index:**

Mode	SSM20A/SSM30A/SSM40A		
Maximum open circuit voltage	<100V		
MPPT voltage range	13V~100V(12V); 26V~100V(24V);		
Maximum input current	20A/30A/40A		
Maximum discharge current	20A/30A/30A		
Solar energy Maximum input power	12V	240W/360W/480W	
	24V	480W/720W/960W	
Battery type adjustable	Support for lead acid, gel, opening and lithium battery (self setting).		
Charge cutoff voltage (24V*2)(36V*3)	(SEAL)	(GEL)	(open) (SELF)

boost Charging voltage	14.6V ±1%	14.2V ±1%	14.8V ±1%	14.0V ±1% (default)
Balance charge voltage	14.4V ±1%	14.2V ±1%	14.6V ±1%	
Float charging voltage	13.8V ±1%	13.8V ±1%	13.8V ±1%	
Charge return voltage	13.3V ±1%	13.3V ±1%	13.3V ±1%	
Charging mode	MPPT or DCDC(Adjustable)			
Maximum charging efficiency	MPPT mode:96%			
Battery plate high voltage protection	Battery voltage is greater than 200V, stop charging; automatic recovery of 1 minutes			
Over current protection	1.1 times rated current, stop charging; auto recovery for 1 minutes			
Load mode	Pure lighting control mode, control mode and control overtime household mode (adjustable)			
under voltage protection	10.8V/21.6V ±1%(adjustabl)			
under voltage recovery	12.8V/25.6V±1%(adjustabl)			
overload protection	1.5 times rated current 3S overload protection action, automatic recovery of 1 minutes			
Output short circuit protection	Hardware protection automatic recovery of 10 minutes			
Controller high temperature protection	The temperature of the radiator is higher than 65 DEG C to stop charging and discharging, and the temperature is reduced to a temperature of 45 DEG C to recover the charge and discharge.			
Exterior dimension	186 x 148 x64.5 mm/1.25KG			
working temperature	-25°C~+60°C			
Storage temperature	-30°C~+70°C			
Humidity requirement	≤90%,No condensation			
Protection level	IP30			
Altitude	≤2000m(2000mAbove altitude need to reduce power use)			
Connection mode	Terminal			
Mounting wire	≤7# AWG (16mm²)			
Circuit Tuo	Buck(Common cathode)			
Remote monitoring function	RS232 Matching			

	Charge OFF	LOW VOLTAGE	LOW VOLTAGE RES
3S	12.4V ±1%	9.0V ±1%	11.0V ±1%
4S (FE LI)	14.2V ±1%	10.8V ±1%	12.8V ±1%
5S	16.4V ±1%	12.0V ±1%	14.6V ±1%
6S	24.8V ±1%	18.0V ±1%	21.9V ±1%
7S	29.0V ±1%	21.0V ±1%	25.6V ±1%
8S (FE LI)	28.4V ±1%	21.6V ±1%	25.6V ±1%