

User Manual



- There are no serviceable parts for this controller. Do **NOT** disassemble or attempt to repair the controller.
- Be careful when working with large lead acid batteries. Wear eye protection and have fresh water available in case there is contact with the battery acid.

GENERAL INFORMATION

The Vu Phong Pulse MPP SCC series models are an advanced charge controllers for off-grid solar applications. It can be used for 12V battery or battery bank. Integrating highly efficient PWM charging, this controller increases battery life and improved system performance. It also can choose the charging voltage based on the PV Current/Voltage Curve to actively control the charging current to battery for high efficiency. The controller is controlled by microprocessor for high accuracy and embedded electronic protection functions that prevent damages from installation mistakes or system faults. The Vu Phong charge controllers are designed for firm, easy and high-current-withstanding connecting by included cable shoes and screws with knobs.

PWM Technology

The controller adopts the advanced series Pulse Width Modulation (PWM) charging mode. With range of 0-100%, it can charge the battery quickly and stably under any condition of solar photovoltaic system. PWM charging mode use automatic conversion duty ratio pulses current to charge the battery. The battery can be fully charged safely and rapidly with the pulse current. Pulse current charging mode makes battery have more time to react which reduces the gassing volume and makes battery improve the acceptance rate of charging current.

Four Charging Stages

- **Bulk Charge:** This algorithm is used for day to day charging. It uses 100% of available solar power to recharge the battery and is equivalent to constant current.
- **Boost Charge:** When the battery has charged to the Boost voltage set-point, it undergoes an absorption stage which is equivalent to constant voltage regulation to prevent heating and excessive battery gassing.
- **Float Charge:** After Boost Charge, the controller will reduce the battery voltage to a float voltage set point. Once the battery is fully charged, there will be no more chemical reactions

and all the charge current would turn into heat or gas. Because of this, the charge controller will reduce the voltage charge to smaller quantity, while lightly charging the battery. The purpose for this is to offset the power consumption while maintaining a full battery storage capacity. In the event that a load drawn from the battery exceeds the charge current, the controller will no longer be able to maintain the battery to a Float set point and the controller will end the float charge stage and refer back to bulk charging.

- **Equalization:** Is carried out every 28 days of the month. It is intentional overcharging of the battery for a controlled period of time. Certain types of batteries benefit from periodic equalizing charge, which can stir the electrolyte, balance battery voltage and complete chemical reaction. Equalizing charge increases the battery voltage, higher than the standard complement voltage, which gasifies the battery electrolyte.

WARNING: Once equalization is active in the battery charging, it will not exit this stage unless there is adequate charging current from the solar panel. There should be NO load on the batteries when in equalization charging stage.

WARNING: Over-charging and excessive gas precipitation may damage the battery plates and activate material shedding on them. Too high of equalizing charge or for too long may cause damage. Please carefully review the specific requirements of the battery used in the system.

1. Specifications

	Pulse MPP 12V 10A 120W	Pulse MPP 12V 20A 250W
System Voltage	12V	
Max Charge Current	10A	20A
Max Solar Power	120W	250W
	Connect units in parallel for greater solar power	
Solar Voltage Range	17~24Voc	
Load Current	10A	
Self-consumption	0.04A	0.08A
Load Control	Intelligent nightlight function (Auto turn the load On at night/Off in the daytime); Low Voltage Disconnect / Reconnect (10.8V /12.8V)	
Charging Methods	4 stages: Bulk, Absorption, Floating; Equalizing (Auto)	
Bulk Charge	15V	
Float Charge	13.8V	
Protections	Reverse Polarity; Overload; Overcharging; Reverse Current at Night; Load Short Circuit; Battery Deep Discharge	
Indications	LEDs: % Battery / Charging / Overload / Wrong poles (Reverse Polarity)	
Recommended Wire Gauge Size	2 x 2.5 mm ²	2 X 4.0 mm ²
Output	DC 2.5mm (2x), USB (1x)	
Dimension	104.5 x 95 x 72 mm; 0.6 kg	228 x 135 x 80 mm; 0.8 kg
Accessories	8mm Solar panel Cable 0.2m + Battery Cable 1m w/ Cable shoe 8mm	

2. Name and Main Function

- a) Power ON/OFF switch: Leave in the OFF position during installation.
- b) Load ON/OFF switch: Control the load connected to Load terminals (3) and (4).
- c) Auto ON/OFF switch: Activate the Intelligent nightlight function for DC 2.5 mm ports
- d) LED indicators:
 - % Battery: 100% / 75% / 50% / 25% / 10%
 - Charging status (yellow): YELLOW ON whenever charging
 - Steady On – Charging
 - Slow flashing – Float Charge
 - Quick flashing – Low charging current (weak charging)
 - Overload (red): Flashes when overload
 - Wrong poles (red): Reverse Polarity
- e) Terminals numbered from LEFT TO RIGHT:
 - (1) Black: Negative (-) terminal for Solar and Battery
 - (2) Red: Positive (+) terminal for Solar
 - (3) Red: Positive (+) terminal for Battery and Load
 - (4) Black: Negative (-) terminal for Load
- f) Load ports: DC 2.5mm (2x), USB (1x)
- g) Ventilation port(s): Allow air flow. Do not obstruct.

3. Installation

3.1. Where to install

The charge controller should be placed on a vertical surface that meets the following requirements:

- a) Dry - Do not allow water to drip or splash on the controller.
- b) Cool - Protected from direct sunlight. Ambient air temperature should be between 0°C and 40°C (the cooler the better).
- c) Ventilated - **NOT** near any heat generating sources and allow at least 6 inches (150mm) of clearance around the controller for air flow. Ensure the ventilation openings are not obstructed.
- d) Safe - There may be sparks when making connections. **NEVER** install the controller in a sealed enclose with flooded batteries or igniting flammable liquids such as gasoline. Gas can accumulate and there is a risk of explosion.

3.2. Hook-up and operation

Connect battery **FIRST**, loads SECOND (if needed) and the solar panel(s) THIRD to the controller. **NEVER** connect solar panels to charge controller without a battery. This may cause a dangerous occurrence where the controller would experience a high open circuit voltage at the terminals.

a) Unpack and inspect your controller, check to see that all switches are in the OFF position.

b) Battery connecting:

Connect the **Positive (+) terminal of the battery to the pole (3) of the controller.**

Connect the **Negative (-) terminal of the battery to the pole (1) of the controller.**

c) Load connecting (if needed):

Connect the **Positive (+) load cable to the pole (3) of the controller.**

Connect the **Negative (-) load cable to the pole (4) of the controller.**

d) Solar panel connecting:

Connect the **Positive (+) solar cable to the pole (2) of the controller.**

Connect the **Negative (-) solar cable to the pole (1) of the controller.**

CAUTION! Tighten the screw to clamp the wires securely. Loose connections result in excessive voltage drop and may cause overheated wires and melted insulation.

e) Set the Power switch of the controller to the ON position. The LED "% Battery" lights. The controller should supply power to the battery. Turn ON and OFF the load by using the Load switch.

4. Auto On/Off (Intelligent nightlight function)

Connect the loads (e.g. lights) to DC 2.5 mm ports at the bottom panel of the controller. When solar module voltage goes below the point of NTTV (Night Time Threshold Voltage) at sunset, the controller will recognize the starting voltage and turn on the load when the battery power is enough and the controller works well. When solar module voltage goes above the point of DTTV (Day Time Threshold Voltage), the solar controller will recognize the starting voltage and turn off the load.

5. System Status Troubleshooting

- "Charging" LED is off during daytime: Check PV and battery connections are correct and tight.
- Loads do not work: Battery is over discharged. The controller cut off the output automatically and recover when fully charged.
- "Overload" LED indicator flashes: Please reduce the number of electric equipment. If not, the controller will cut off the output automatically after 6 seconds to protect itself.

6. Maintenance

You should clean the exterior of the unit periodically with a damp cloth to prevent dust and dirt.

For best performance, it is recommended that these tasks be performed from time to time.

1. Check that controller is mounted in a clean, dry, and ventilated area.
2. Check wiring going into the charge controller and make sure there is no wire damage or wear.
3. Tighten all terminals and inspect any loose, broken, or burnt up connections