Thank you for selecting our Photonic Universe EU series solar charge controller. Please read this manual carefully before using the product, paying close attention to the safety information provided.

EU series solar charge controller

1. Overview

This EU series solar charge controller combines innovative PWM technology with an extensive range of electronic safety features to charge and protect your batteries.

2. Safety Information

- Read the full instruction manual before installing the solar charge controller and make sure you understand all requirements, procedures and warnings.
- Ensure that this model is suitable for your system and that the current rating limit of the solar controller is never exceeded by the solar panel or load.
- Do not disassemble or attempt to repair the controller.
- Install external fuse(s) or breaker(s) as required.
- Connect system components in the order recommended by the manual.
- All power connections must be tightened, secure, and properly insulated if applicable.
- Do not allow any contact with water, oil or grease.
- This controller is suitable for solar panels only. Do not use it with any other source of energy such as a wind turbine or mains charger.
- This controller can be used with a 12V battery or 12V battery bank (several similar 12V batteries connected in parallel: + to +, - to -).
- Please take the appropriate precautions to minimise the risk of electric shock: use insulated tools, wear gloves and follow general safety requirements.

3. Product Features

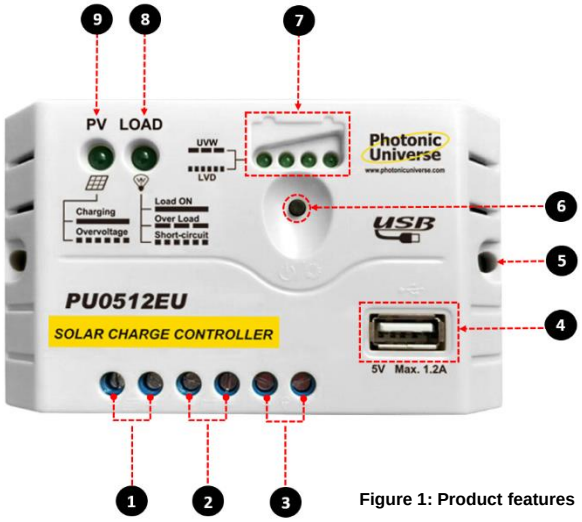


Figure 1: Product features

①	Solar terminals	⑥	Load On/Off switch button
②	Battery terminals	⑦	Battery status LED indicator
③	Load terminals	⑧	Load status LED indicator
④	USB output interface	⑨	Charging status LED indicator
⑤	Mounting Hole Φ4.5mm		

4. Wiring

- Connect the system in the following order: ❶battery ➔ ❷load ➔ ❸PV array in accordance with Figure 2: “Connection Diagram” and disconnect the system in the reverse order: ❸➔❷➔❶.
- Ensure that the positive and negative polarity connection is correct and all terminals are tightened.

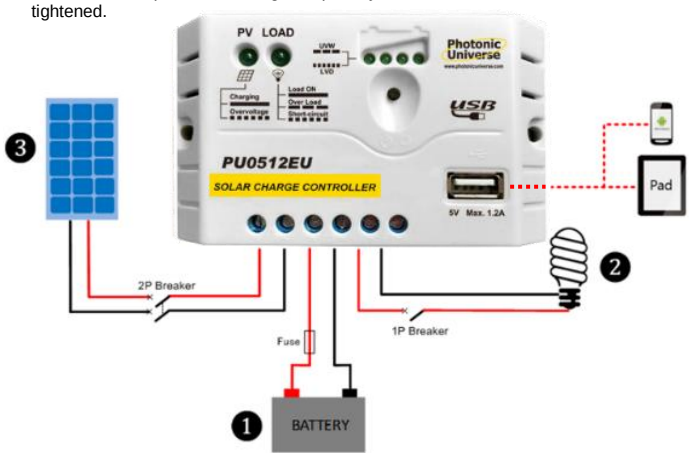


Figure 2: Connection diagram

- The load terminals do not have to be connected if the controller is used for battery charging only. The load terminals are designed for small loads in applications which would benefit from low battery cut off protection.

When mounting, ensure enough room for air to flow through the controller heat sink. There should be at least 150 mm of space above and below the controller to allow air flow for cooling. Do not mount on combustible surfaces.

Risk of explosion! Never install the controller in a closed place with flooded batteries! Do not install the controller in any closed area where battery gases can accumulate

Fully secure all wiring. Use cable clamps to prevent cables from unnecessary movement. Unsecured cables create loose and resistive connections which may lead to overheating and/or fire.

While wiring the controller do not close circuit breakers/fuses

Never short circuit battery positive (+) and negative (-) or cables.

A fuse must be installed on the battery side (no further than 150mm from the battery). Fuse current must be 1.25 to 2 times the controller rated current.

Do not connect any loads with surge power exceeding the current rating of the controller. Do not connect any power inverters to the load terminals.

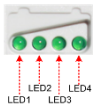
The load terminals cannot be used for charging a second battery.

5. LED Indicators

1) Charging and load status indicator:

Indicator	Color	Status	Instruction
Charging status LED indicator (PV)	Green	On Solid	In Charging
	Green	OFF	No Charging
	Green	Fast Flashing	Battery Over Voltage
Load status LED indicator (LOAD)	Green	On Solid	Load ON
	Green	OFF	Load OFF
	Green	Slowly Flashing	Overload
	Green	Fast Flashing	Load short circuit

2) Battery status indicator:



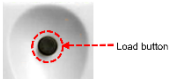
LED1	LED2	LED3	LED4	Battery Status
Slowly Flashing	×	×	×	Under voltage
Fast Flashing	×	×	×	Over discharge
Flashing	Flashing	Flashing	Flashing	Battery disconnected (see Troubleshooting section 8)
Battery LED indicator status while the battery is being charged				
○	○	×	×	12.8V＜ U_{bat} ＜13.4V
○	○	○	×	13.4V＜ U_{bat} ＜14.1V
○	○	○	○	14.1V ＜ U_{bat}
Battery LED indicator status while the battery is discharging				
○	○	○	×	12.8V＜U_{bat}＜13.4V
○	○	×	×	12.4V＜U_{bat}＜12.8V
○	×	×	×	U_{bat}＜12.4V

NOTE:

① Voltage values are for a 12V system at 25 ºC. Please double values for a 24V system.

② "○" LED indicator on; "×" LED indicator off.

6. Setting Operation



1) Load ON/OFF:

When the controller is powered on, press the button to control the load output.

2) Battery Type:

Step 1: Enter setting mode by pressing the button for 5s until the battery status LEDs are flashing.

Step 2: Select the desired mode by pressing the button.

Step 3: The mode will be saved automatically after no operation for 5S and the LED will stop flashing.

Battery Type Indicator:

LED1	LED2	LED3	Battery type
○	×	×	Sealed (Default)
○	○	×	Gel

○	○	○	Flooded

NOTE: "○"LED indicator on "×"LED indicator off

Battery Voltage Control Parameters:

Battery Type	Sealed	Gel	Flooded
Over Voltage Disconnect Voltage	16.0V	16.0V	16.0V
Charging Limit Voltage	15.0V	15.0V	15.0V
Over Voltage Reconnect Voltage	15.0V	15.0V	15.0V
Equalize Charging Voltage	14.6V	——	14.8V
Boost Charging Voltage	14.4V	14.2V	14.6V
Float Charging Voltage	13.8V	13.8V	13.8V
Boost Reconnect Charging Voltage	13.2V	13.2V	13.2V
Low Voltage Reconnect Voltage	12.6V	12.6V	12.6V
Under Voltage Warning Reconnect Voltage	12.2V	12.2V	12.2V
Under Voltage Warning Voltage	12.0V	12.0V	12.0V
Low Voltage Disconnect Voltage	11.1V	11.1V	11.1V
Discharging Limit Voltage	10.6V	10.6V	10.6V
Equalize Duration	120 min.	——	120 min.
Boost Duration	120 min.	120 min.	120 min.

The above parameters are for a 12V system at 25 ºC. Please double the values for a 24V system.

7. Protection Features

- **Battery Over Voltage Protection**: When the battery voltage reaches the *Over Voltage Disconnect Voltage* (OVD) point, the controller will stop charging the battery to protect it from becoming overcharged and damaged.
- **Battery Over Discharge Protection**: When the battery voltage reaches the *Low Voltage Disconnect Voltage* (LVD) point, the controller will stop discharging the battery to protect it from over-discharge.
- **Overload Protection**: Load will be switched off when excessive current is detected. Disconnect excessive load appliances, then restart the controller.
- **Load Short Circuit Protection**: Load will be switched off when load short circuit (≥3 times rated current) occurs. Clear the fault, then restart the controller.
- **High Voltage Transient Protection**: The controller is protected against high voltage transients to a certain extent. In lightning-prone areas, additional external suppression is recommended.

8. Troubleshooting

Faults	Possible Reasons	Troubleshooting
No Charging status LED	Solar panel / Battery connection problem	Check that solar and battery connections are correct, tight and secure. Measure the solar panel voltage with a multimeter
No Battery status LED	Battery voltage is less than 8V	Measure battery voltage with multi-meter. Controller will only start at 8V.
All battery LEDs are flashing	Battery connection is lost	The solar panel is connected but the battery is disconnected from the controller. Check the fuse, battery voltage and connections.
Charging status LED: Flashing fast	Battery over voltage	Disconnect the solar array. Check whether battery voltage is too high.
LED 1: Flashing fast	Battery over discharged	Load output will switch off automatically. LED will return to normal when the battery gets charged.
Load status LED: Flashing slowly	Overload *	Reduce number of connected appliances. Press load button or restart controller
Load status LED: Flashing fast	Load short circuit (>= 3 times rated current)	Check load connection and clear the fault. Press load button or restart controller.

***** When load current exceeds 1.25 times / 1.5 times / 2 times the nominal value, the controller will automatically turn off the load terminals in 60s, 5s and 1s respectively.

9. Technical Specifications

	PU0512EU	PU1012EU	PU1024EU
Nominal system voltage	12V DC		12/24V DC Auto
Rated charge current	5A	10A	
Rated discharge current	5A	10A	
Battery input voltage range	8V～16V		8V～32V
Max. PV open circuit voltage	30V		50V
Self-consumption	12V≤5mA; 24V≤7mA		
Charge Circuit Voltage Drop	≤0.13V		
Discharge Circuit Voltage Drop	≤0.17V		
USB input interface	5VDC/1.2A		
Temperature compensation coefficient	-5mV/ ºC /2V		
Working environment temperature	-35 ºC ～ +55 ºC		
Humidity	≤95%,(N.C.)		
Enclosure	IP20		
Grounding	Common Positive		
Overall dimension (mm)	109.7 x 65.5 x 20.8	120.3 x 67 x 21.8	
Mounting dimension (mm)	100.9	111.5	
Mounting hole size (mm)	Φ4.5		
Terminals (mm^2)	14AWG / 2.5	12AWG / 4	12AWG / 4
Net weight	0.09kg	0.10kg	0.10kg

10. Warranty

This product is covered by a 1 year warranty. The warranty is invalid under the following conditions:

- Damage resulting from improper use or use in an unsuitable environment.
- PV or load current, voltage or power exceeding the rated value of controller.
- Connection of any of the components with an incorrect polarity.
- User disassembly or attempted repair of the controller without permission.
- Damage to the controller due to natural causes such as lightning.
- Damage to the controller during transportation or shipment.
- Contact with water, liquid, oil, grease or other chemicals and substances

The details in this user manual are subject to change without prior notice.