Thank you for selecting the LS LPLW series solar charge controller with built in LED driver. Please read this manual carefully before using the product and pay attention to the safety information.

Solar Charge Controller

---with built-in LED Driver

1. Overview

The LS LPLW series controller combines the solar charge controller and LED constant current driver in one unit. It is ideal for solar LED lighting, especially for LED lamp application that requires dimmer function. The advanced charging methods of pulse width modulation enable system charging and discharging management to obtain the most radical optimization. Make the system reduce the cost and increase the system flexibility. The features are listed below:

- Apply to lead-acid battery and lithium battery
- Lithium battery self-activating function
- Lithium battery low-temperature protection function
- Intelligent power mode with 365-day lighting control technology
- Load reduce the power automatically
- Load power limitation function
- Maximum output efficiency of 96%
- Digital precision constant current control and the control accuracy no less than 30mA
- Multiple load control modes
- Load test function for detecting the system
- Light ON delay time can be adjustable(minimum value 10s)
- Intense penetration and long communication distance with 2.4G communication technology
- Low power consumption control function of 2.4G wireless communication
- Ultra-low power consumption mode in transporting
- Enter the password when it is set parameters
- Controller's parameter can be set via the APP, RC11, and FC02
- Extensive electronic protections

2. Product Features

Figure 1 Product Feature

❶	Temperature Sensor	❺	Battery Positive and Negative Wires
❷	Charging Status LED indicator	❻	Load Positive and Negative Wires
❸	Battery Status LED indicator	❼	2.4G wireless communication
❹	PV Positive and Negative Wires	❽	Mounting hole size

※ The controller charge or discharges the battery at 25℃ as default and no temperature compensation when the temperature sensor is damaged.

3. Wiring

● Reference for Serial connection of LED

System Voltage	Serial connection	Min. Output Voltage	Max. Output Voltage
12V	5～18 LED	15V	60V
4V	10～18 LED	30V	60V

WARNING	DO NOT electric shock! With the built-in boost LED driver, the output voltage is higher than the human safety voltage. If the LED connection number is wrong, the load or controller is damaged.
CAUTION	The above LED (1W, 3.3V) is calculated. If the user uses the unconventional LED, The actual LED voltage must less than the Max. Load Output Voltage.

● Connection Order

1) Connect components to the charge controller in the sequence❶ > ❷ > ❸, as shown above, and pay much attention to the "+" and "-." Please don't insert the fuse or turn on the breaker during the installation. When disconnecting the system, the order is reversed.

2) Check the battery LED indicator is ON when you power on the controller; otherwise, please refer to chapter 8.

3) Connect a fuse in series through battery positive (+) in the circuit. The battery fuse must be 1.25 to 2 times the rated current. The installed distance is within 150mm.

● Load self-test function

The load is ON when the controller power on for 10 seconds. After 10 seconds, it restores to set working mode.

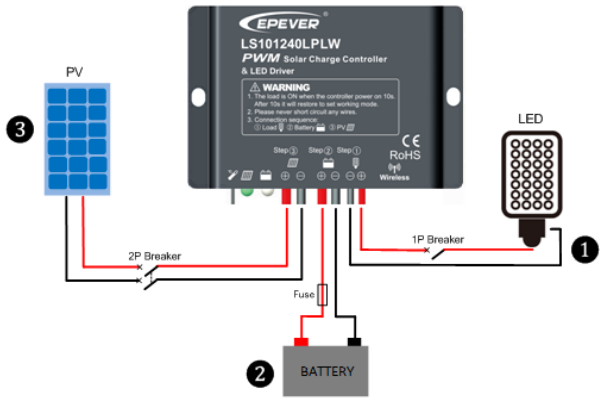


Figure 2 Wiring

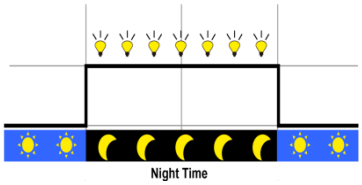
4. LED Indicators

Indicator	Color	Status	Instruction
	Green	On Solid	PV connection normal but low voltage (irradiance) from PV, no charging
	Green	Slowly Flashing(1Hz)	In charging
	Green	Fast Flashing(4Hz)	PV reverse polarity
	Green	OFF	No PV voltage(night time) or PV connection problem
	Green	On Solid	Normal
	Green	Slowly Flashing(1Hz)	Full
	Green	Fast Flashing(4Hz)	Overvoltage
	Orange	On Solid	Under voltage
	Red	On Solid	Over-discharged
	Red	Slowly Flashing(1Hz)	Battery Overheating
All indicators	Green and orange	Flashing two times	Set parameters successfully

5. Load Working Mode

1) Manual Mode

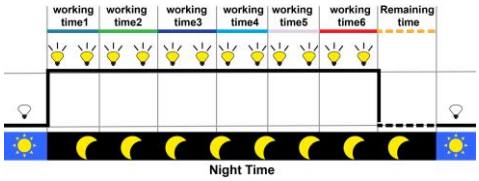
2) Light ON/OFF(default)



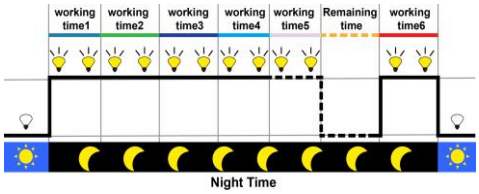
Turn-On voltage (Adjustable): 5V(12Vsystem), delay10min.
Turn-Off voltage (Adjustable): 6V(12Vsystem), delay10min.
Note: 24V system voltage×2

3) Light ON + Timer

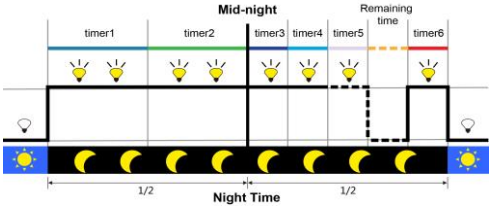
Light ON + Timer1



Light ON + Timer2



Light ON + Timer3



Item	Default※		Range
	Mode1	Mode2/3	
LED Rated Current	0.35A		0-2.6A(LS101240LPLW) 0-2.0A(LS102460LPLW) 0-4.0A(LS2024120/101260LPLW)
Timer1 LED Rated Current Percentage	2H 100%	1H 100%	00:00—23:59H 0—100%
Timer2 LED Rated Current Percentage	2H 80%	1H 50%	00:00—23:59H 0—100%

Timer3 LED Rated Current Percentage	**2H** **50%**	**0H** **0%**	00:00—23:59H 0—100%
Timer4/5 LED Rated Current Percentage	**0H** **0%**	**0H** **0%**	00:00—23:59H 0—100%
Timer6 LED Rated Current Percentage	**0H** **0%**	**2H** **100%**	00:00—23:59H 0—100%

※ The default value can be changed according to the user's requirement.

4)Time Control

Control the load on/off time by setting the real-time clock.

5) Intelligent Power Reduction Mode

When the battery voltage goes lower than the "Reduce Power Start Voltage (adjustable)," the intelligent power reduction mode is enabled. The LED output current is automatically reduced in linear with the battery's voltage drop. When the battery voltage goes lower than the "Reduce Power End Voltage (adjustable)," the LED output current is 2% of the rated load current. The minimum percentage can be set to 1%. Also, when the battery voltage is higher than "Reduce Power Start Voltage," the controller exits the intelligent power reduction mode.

CAUTION

- In Light ON/OFF and Light ON/Timer mode, the load is turned on after a 1-minute delay，the delay time can be set.
- The controller's real-time clock is an analog clock, valid at power-on and invalid after power-off. When using the time mode, the clock needs to be calibrated by handheld devices. Do not power off the controller after calibration.

6. Setting Operation

There are two methods to check and set the controller's parameters:

1) 2.4G Remote Controller—RC11

This method can realize one-key setting operation which is suitable for bulk quantity products setting or applied in the projects.

2) Super Parameter Programmer—FC02

NOTE: Please refer to the user manual of handheld device.

7. Protection

Protection	Conditions	Status
PV Reverse Polarity	When the battery is correctly connecting, the PV can be reversed.	The controller is no damage
Battery Reverse Polarity	When the PV is not connected, or the connection reversed, the battery can be reversed. **WARNING: Controller is damaged when the PV connection is correct, and the battery connection is reversed!**	
Battery Over Voltage	The battery voltage reaches the OVD	Stop charging
Battery Over Discharge	The battery voltage reaches the LVD	Stop discharging
Battery Overheating	The temperature sensor is higher than 65℃	Output is OFF
	The temperature sensor is less than 55℃	Output is ON
Lithium battery Low Temperature★	The temperature sensor is less than the low-temperature value	Stop charging or discharge
	The temperature sensor is higher than the low- temperature value	Begin charging or discharge
Load Short Circuit	Load current ≥2.5 times rated current In one short circuit, the output is OFF 5s; Two short circuits, the output is OFF 10s; Three short circuits, the output is OFF 15s; Four short circuits, the output is OFF 20s; Five short circuits, the output is OFF 25s; Six short circuits, the output is OFF	Output is OFF **Clear the fault:** Restart the controller or wait for one night-day cycle (night time>3 hours).
Load Open Circuit(Load over voltage)	Max. load voltage≥68V One open circuit, the output is OFF 5s; Two open t circuits, the output is OFF 10s; Three open circuits, the output is OFF 15s; Four open circuits, the output is OFF 20s; Five open circuits, the output is OFF 25s; Six open circuits, the output is OFF5s; Seven open circuits, the output is OFF5s	Output is OFF (Cycle to perform)

★ If selecting a lithium battery, the low-temperature value(LTV) must be set according to the specification; otherwise, the lithium battery is damaged.

8. Protection

Faults	Possible reasons	Troubleshooting
Charging LED indicator off during the daytime when sunshine falls on PV modules properly	PV array disconnection	Confirm that PV and battery wire connections are correct and tight
No LED indicator	Min.9V can start up the controller.	Measure the battery voltage with a multi-meter. Min.9V can start up the controller.
Battery LED indicator green Fast Flashing	Battery over voltage	①Disconnect the solar array and measure the battery voltage; ②Change the controller; ③ Change the battery
Battery LED indicator red	Battery over discharged①	When the battery voltage is restored to or above setpoint (low voltage reconnect voltage), the load work
Battery Status LED red indicator flashing	Battery Overheating	The controller automatically stops working. When the temperature is below 50 ºC, the controller resumes working.
All the LED indicator flashing(battery red indicator flashing)	System voltage error	Check whether the battery voltage matches the controller's working voltage. Please change to a suitable battery or reset the working voltage
Power on normally, the load is off	①Unreliable wiring, the connection fails. ②The loading mode is wrong ③The controller does not match with the LED light. ④Output short circuit	①Check the connecting cables ②Check the load mode and parameter ③The voltage of the LED-light source is not in the output voltage range of the controller ④Check the connecting cables and LED light source
The dimming function is invalid	The controller does not match with the LED light source. This product is a step-up current control; if the input voltage is lower than the rated voltage, it is not working.	①Replace the LED light ②Reduce system rated voltage grade and replaced the product model For example, switch the 24V system to a 12V system, and replace the corresponding controller.

① When the battery is over-discharged, the battery indicator is red. The load keeps off all the time before the voltage is more than the Low Voltage Reconnect Voltage (LVRV). To judge the system is normal or not, firstly measuring the battery voltage, whether it is more than LVRV; if not, restarting the controller to detect the load.

WARNING The LVRV can be set, but it must be done carefully to avoid damaging the battery if the LVRV is set too low.

9. Technical Specifications

Item		LS101240LPLW	LS101260LPLW	LS102460LPLW	LS2024120LPLW
Nominal system voltage		12VDC	12VDC	12/24VDC◆ or Auto	
Rated charge current		10A	10A	10A	20A
Max. PV open circuit voltage		30V		50V	
Battery input voltage range		9～16V		9～32V	
Max. output power		40W/12V	60W/12V	30W/12V 60W/24V	60W/12V 120W/24V
Max. output Current		2.6A	4.0A	2.0A	4.0A
Output voltage range		(Max. Battery Voltage +2V)～60V			
Load open circuit voltage		60V			
Maximum output efficiency		96%			
Output current control accuracy		≤30mA			
Battery Type		**Lead-acid battery:** Sealed(default)/Gel/Flooded/User **Lithium battery:**LiFePO4/Li-NiCoMn/User			
Lead-acid battery	Equalization Voltage▼	Sealed:14.6V; Flooded:14.8V;User:9-17V			
	Boost Voltage▼	Sealed:14.4V;Gel:14.2V;Flooded:14.6V;User:9-17V			
	Float Voltage▼	Sealed/Gel/Flooded:13.8V;User:9-17V			
	Reduce Power Start Voltage ▼	Sealed/Gel/Flooded:12.2V;User:9-17V			
	Reduce Power End Voltage ▼	Sealed/Gel/Flooded:12.0V;User:9-17V			
	Low Voltage Reconnect Voltage▼	Sealed/Gel/Flooded:12.6V:User:9-17V			
	Low Voltage Disconnect Voltage▼	Sealed/Gel/Flooded:11.1V:User:9-17V			
Lithium battery	Boost Voltage▼	LiFePO4(4s):14.5V/Li-NiCoMn(3s):12.5V/User:9-17V			
	Reduce Power Start Voltage ▼	LiFePO4(4s):12.8V/Li-NiCoMn(3s):12.2V/User:9-17V			
	Reduce Power End Voltage ▼	LiFePO4(4s):12.0V/Li-NiCoMn(3s):10.5V/User:9-17V			
	Low Voltage Reconnect Voltage▼	LiFePO4(4s):12.8V/Li-NiCoMn(3s):10.5V/User:9-17V			
	Low Voltage Disconnect Voltage▼	LiFePO4(4s):11.1V/Li-NiCoMn(3s):9.3V/User:9-17V			
Self-consumption		≤19mA(12V);≤35mA(24V)			
Charge Circuit Voltage Drop		≤0.17V			
Communication way		2.4G			
Communication distance		≤20m			
Working environment temperature		-40℃～+55℃			
Enclosure		IP68(1.5m,72h)			
Dimension(mm)		87x60x22.8	87x67x24.8	87x63x24.8	108.5x88x25.6
Mounting size(mm)		80	80	80	100.5
Mounting hole size(mm)		Φ4	Φ4	Φ4	Φ5
Power cable(AWG/mm²)		PV/BAT:14/2.5 LOAD:18/1.0			PV/BAT:12/4.0 LOAD:18/1.0
Net weight		0.17kg	0.20kg	0.20kg	0.40kg

◆ When selecting a lithium battery, the controller cannot automatically recognize the nominal system voltage and has no temperature compensation.

▼ The parameters are the 12V system at 25 ºC, double the values in the 24V system.

10. Disclaimer

This warranty does not apply under the following conditions:

- Damage from improper use or use in an unsuitable environment.
- PV or load current, voltage, or power exceeds the rated value of the controller.
- The controller's working temperature exceeds the limit working temperature.
- User disassembly or attempted to repair the controller without permission.
- The controller is damaged due to natural elements such as lighting.
- The controller is damaged during transportation or shipment.

Any changes without prior notice! **Version number：V2.2**