

*Solar Amp mini*  
**Solar Charge Controller**  
**User's Manual**



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# 1. Safety Instructions

This document contains important safety and operating information for **SolarAmp mini**. To work **SolarAmp mini** the best, use controller only as described in safety instructions. Carefully read through the safety instructions before mounting **SolarAmp mini**.



## WARNING

This sign indicates the following contents includes important information. The wrong order of handling may lead to the risk of death or seriously injured.



## CAUTION

This sign indicates the following contents includes important information. The wrong order of handling may cause damage to the products and the surrounding stuff.

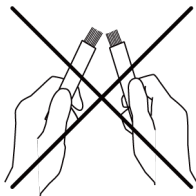


## MEMO

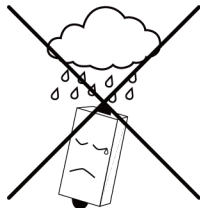
This sign indicates the following contents includes important information of manuals about functions which contains safety instructions or proper operation of **SolarAmp mini**.

## 1-1 Precautions During Installation

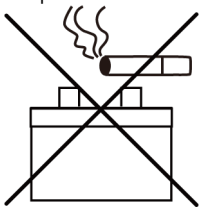
· Do NOT short circuit



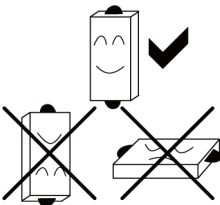
· Protect from direct rain



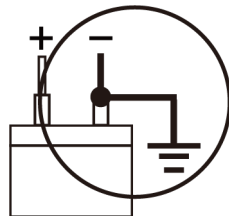
· Explosion hazard



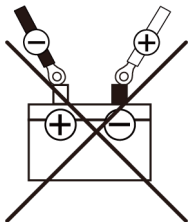
· Mounting direction



· Negative earth ground



· Do NOT reverse polarity Connection

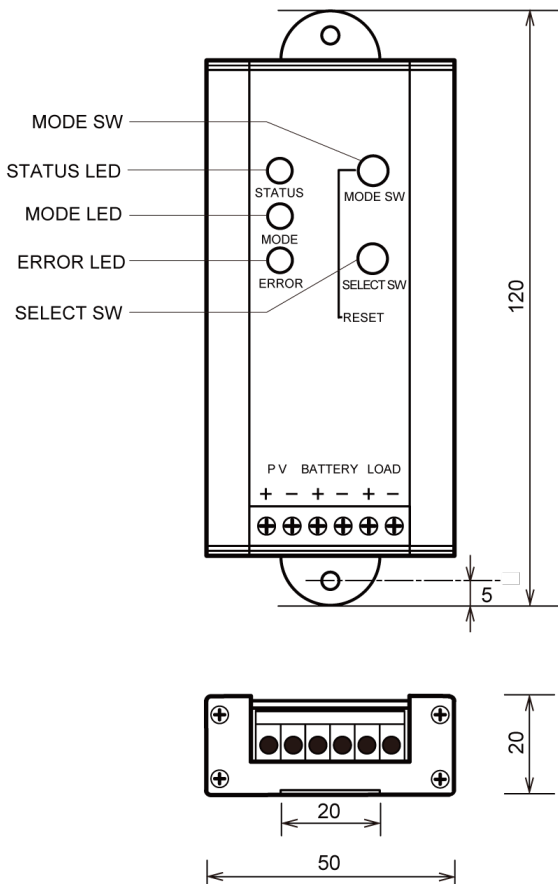


## 2. Product Overview

### 2-1 Specification

Model No.	SA-MN05-8	
System Voltage	12Vdc	
Max. Input Voltage	25Vdc	
Max. Input Current	8.5A	
Max. Load Current	8.5A	
Min. input battery Voltage	6Vdc	
Self-consumption Current	1mA	
Charging Algorithm	3-stage (Bulk, Absorption, Float)	
Charging/ float Voltage	Sealed Battery	14.1Vdc/13.7Vdc
	Flooded Battery	14.4Vdc/13.7Vdc
	AGM Battery	14.3Vdc/13.3Vdc
	Gel Battery	14.0Vdc/13.7Vdc
Over Discharge Protection	Load Disconnect Voltage	11.5Vdc ( $\pm 0.2$ Vdc)
	Load Reconnect Voltage	12.5Vdc ( $\pm 0.2$ Vdc)
Reverse Polarity Protected	Fuse (10A)	
Battery Type	Sealed, Flooded, AGM, Gel	
Wire Size	16AWG (1.3mm <sup>2</sup> ) to 22AWG (0.33mm <sup>2</sup> )	
Grounding	Negative ground	
Temperature Coefficient	-30mV/°C	
Operation Temperature	-20°C to +60°C	
Storage Temperature	-30°C to +70°C	
Humidity	5~95% RH (non-condensing)	
Dimensions (W×H×D)	50×120×20mm	
Weight	105g	

## 2-2 Appearance

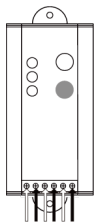


Unit: mm

### 3. Connection

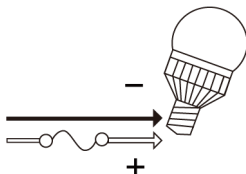
#### 1. Connect wires to **SolarAmp mini**

Recommended wire size is 16 to 22AWG (1.3-0.33mm<sup>2</sup>). Screw tightly so as not to come loose easily.



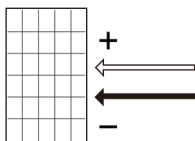
#### 2. Connect to load

It is recommended to install an external fuse (less than 10A) between controller and load.



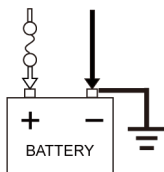
#### 3. Connect to PV

For safety, cover the PV with cloth when wiring. Make PV not to generate power during installation.



#### 4. Connect to battery

It is recommended to install an external fuse (less than 10A) between controller and battery. And connect battery to earth ground if necessary. (Negative ground)



**CAUTION**

Do Not connect reverse polarity.



**CAUTION**

Do Not short circuit.



**CAUTION**

Do Not connect DC-AC inverter to the load terminal.

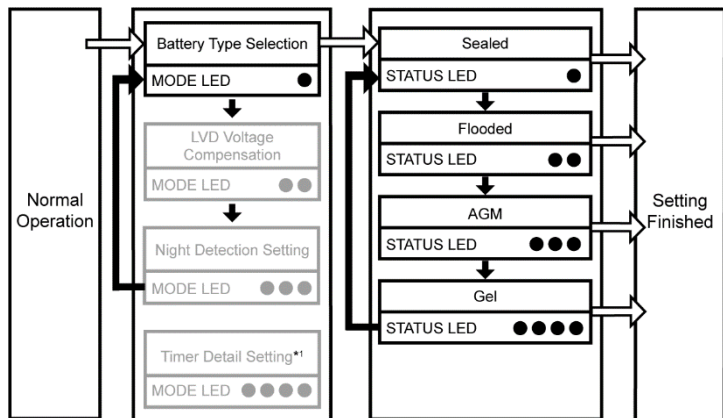
## 4. Operation

### 4-1 Battery Type Selection



#### MEMO

Follow the white arrow when push the MODE SW (White Button).  
Follow the black arrow when push the SELECT SW (Red Button).



1. Push the MODE SW during normal operation, and MODE LED will blink.
2. Push the SELECT SW, and the number of MODE LED blinks will change.
3. Check the MODE LED 1 blink (Battery Type Selection), then push the MODE SW.
4. Push the SELECT SW, and the number of STATUS LED blinks will change. The STATUS LED blinks indicate the battery type as below. Push the SELECT SW to desired battery type.
  - STATUS LED 1 blink: Sealed
  - STATUS LED 2 blinks: Flooded
  - STATUS LED 3 blinks: AGM
  - STATUS LED 4 blinks: Gel
5. Check the number of STATUS LED blinks, then push the MODE SW to finish the setting. All of the LEDs blink twice, and return to normal operation.

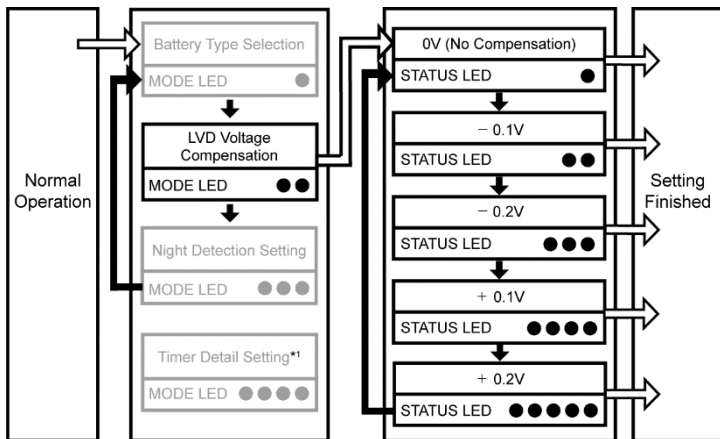
\*1 Timer Detail Settings cannot be selected at this stage. To access, please see 4-3 Night Detection Setting before.

## 4-2 LVD Voltage Compensation



### MEMO

Follow the white arrow when push the MODE SW (White Button).  
Follow the black arrow when push the SELECT SW (Red Button).



1. Push the MODE SW during normal operation, and MODE LED will blink.
2. Push the SELECT SW, and the number of MODE LED blinks will change.
3. Check the MODE LED 2 blinks (LVD Voltage Compensation), then push the MODE SW.
4. Push the SELECT SW, and the number of STATUS LED blinks will change. The STATUS LED blinks indicate the compensating voltage as below. Push the SELECT SW to desired voltage.
  - STATUS LED 1 blink: 0V (No Compensation)
  - STATUS LED 2 blinks: -0.1V
  - STATUS LED 3 blinks: -0.2V
  - STATUS LED 4 blinks: +0.1V
  - STATUS LED 5 blinks: +0.2V
5. Check the number of STATUS LED blinks, then push the MODE SW to finish the setting. All of the LEDs blink twice, and return to normal operation.

\*1 Timer Detail Settings cannot be selected at this stage. To access, please see 4-3 Night Detection Setting before.

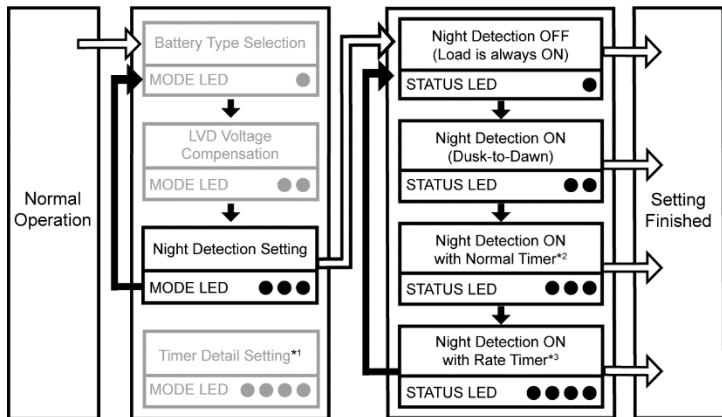


## 4-3 Night Detection Setting



### MEMO

Follow the white arrow when push the MODE SW (White Button).  
Follow the black arrow when push the SELECT SW (Red Button).



1. Push the MODE SW during normal operation, and MODE LED will blink.
2. Push the SELECT SW, and the number of MODE LED blinks will change.
3. Check the MODE LED 3 blinks (Night Detection Setting), then push the MODE SW.
4. Push the SELECT SW, and the number of STATUS LED blinks will change. The STATUS LED blinks indicate the modes of Night Detection Setting as below. Push the SELECT SW to desired mode.
  - STATUS LED 1 blink: Night Detection OFF (Load is always ON)
  - STATUS LED 2 blinks: Night Detection ON (Dusk-to-Dawn)
  - STATUS LED 3 blinks: Night Detection ON with Normal Timer
  - STATUS LED 4 blinks: Night Detection ON with Rate Timer
5. Check the number of STATUS LED blinks, then push the MODE SW to finish the setting. All of the LEDs blink twice, and return to normal operation.

\*1 Timer Detail Setting can be accessed after normal timer or rate timer be selected.

\*2 To set up normal timer detail, please refer to 4-4 Normal Timer Setting.

\*3 To set up rate timer detail, please refer to 4-5 Rate Timer Setting.

## 4-4 Normal Timer Setting



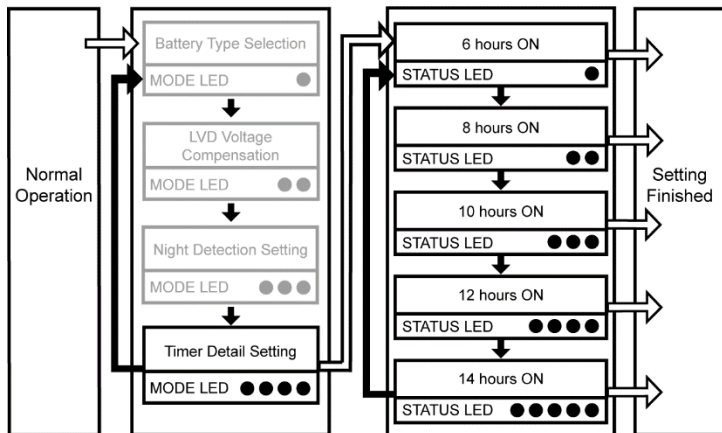
### MEMO

Refer to 4-3 Night Detection Setting and select the Normal Timer before setting the timer detail.



### MEMO

Follow the white arrow when push the MODE SW (White Button).  
Follow the black arrow when push the SELECT SW (Red Button).



1. Push the MODE SW during normal operation, and MODE LED will blink.
2. Push the SELECT SW, and the number of MODE LED blinks will change.
3. Check the MODE LED 4 blinks (Timer Detail Setting), then push the MODE SW.
4. Push the SELECT SW, and the number of STATUS LED blinks will change. The STATUS LED blinks detail as below. Push the SELECT SW to select timer hours.
  - STATUS LED 1 blink: 6 hours ON
  - STATUS LED 2 blinks: 8 hours ON
  - STATUS LED 3 blinks: 10 hours ON
  - STATUS LED 4 blinks: 12 hours ON
  - STATUS LED 5 blinks: 14 hours ON
5. Check the number of STATUS LED blinks, then push the MODE SW to finish the setting. All of the LEDs blink twice, and return to normal operation.

## 4-5 Rate Timer Setting



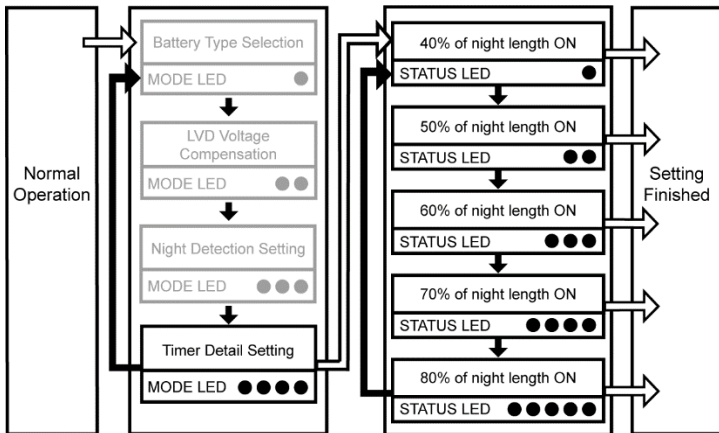
### MEMO

Refer to 4-3 Night Detection Setting and select the Rate Timer before setting the timer detail.



### MEMO

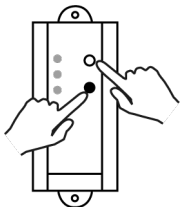
Follow the white arrow when push the MODE SW (White Button). Follow the black arrow when push the SELECT SW (Red Button).



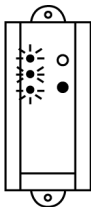
1. Push the MODE SW during normal operation, and MODE LED will blink.
2. Push the SELECT SW, and the number of MODE LED blinks will change.
3. Check the MODE LED 4 blinks (Timer Detail Setting), then push the MODE SW.
4. Push the SELECT SW, and the number of STATUS LED blinks will change. The STATUS LED blinks detail as below. Push the SELECT SW to select rate timer percentage.
  - STATUS LED 1 blink: 40% of night length ON
  - STATUS LED 2 blinks: 50% of night length ON
  - STATUS LED 3 blinks: 60% of night length ON
  - STATUS LED 4 blinks: 70% of night length ON
  - STATUS LED 5 blinks: 80% of night length ON
5. Check the number of STATUS LED blinks, then push the MODE SW to finish the setting. All of the LEDs blink twice, and return to normal operation.

## 4-6 Reset

1. Push MODE SW and SELECT SW simultaneously.

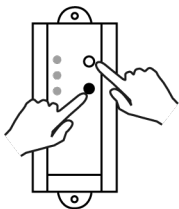


2. Release both of the SWs then LED blink twice. **SolarAmp mini** is reset to last setting.

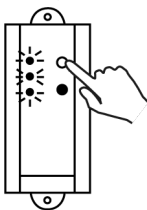


## 4-7 Factory default

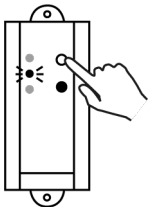
1. Push MODE SW and SELECT SW simultaneously.



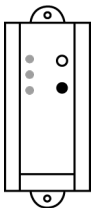
2. Keep pushing MODE SW and release the SELECT SW only.



3. Hold on the MODE SW five seconds and the MODE LED keeps to light during the MODE SW is pushed.

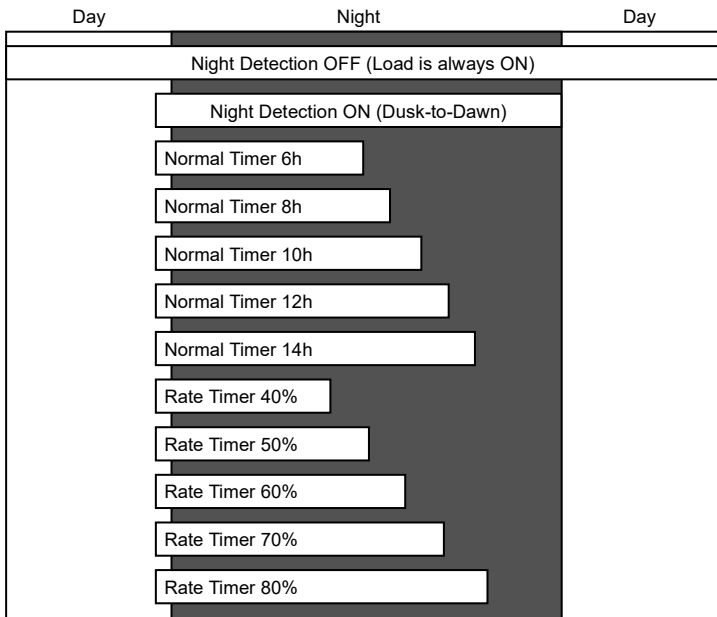


4. Release the MODE SW after MODE LED turned off. **SolarAmp mini** is reset to the factory default.



# 5. Night Detection Function

## 5-1 Multi Timer



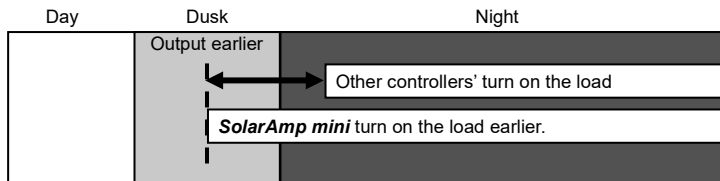
### Four Operation Modes

Mode	Load Description	Timer Detail
Night Detection OFF	Load is always ON.	---
Night Detection ON (Dusk-to-Dawn)	Load is ON all night.	From dusk to dawn
Night Detection ON (Normal Timer)	Load is turned ON from dusk and be turned OFF after the selected hours.	6, 8, 10, 12, 14hours
Night Detection ON (Rate Timer)	Load is turned ON from dusk and be turned OFF after the selected percentages of night length.	40, 50, 60, 70, 80%

## 5-2 Load Test Method

When the Night Detection is ON, push the SELECT SW more than two seconds, the load will be turned on. Release the SW, the load will be turned off. This method is effective only before the load turn on in the day time.

## 5-3 Early Start Lighting Function



**SolarAmp mini** has the Early Start Lighting Function. The load will be turned on from dusk. This will function in next 1 or 2 days after system installed.

Immediately after installation or during sudden bad weather, load will be turned on depending on the conditions of the input voltage from the solar modules. The conditions are as follows.

1. Solar voltage drops under 10V more than 3 minutes.
2. After 3 minutes, solar voltage drops under 8V.

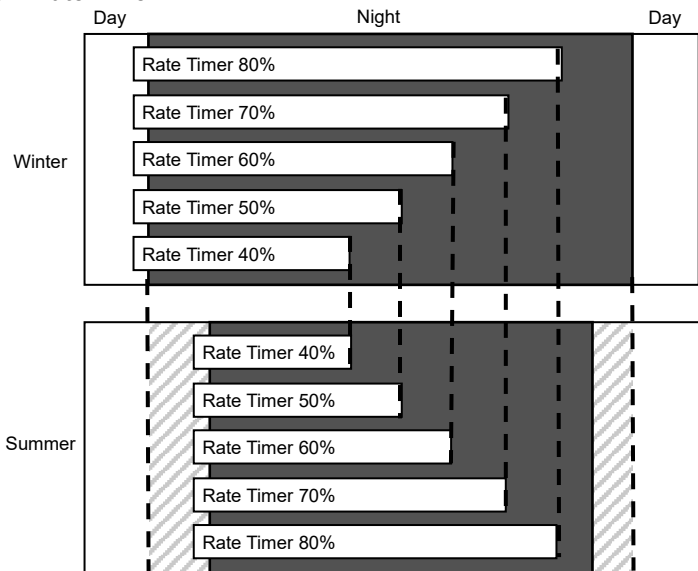
Therefore, it is necessary to wait at least 3 minutes from the charging state to the load be turned on.



### MEMO

When Night Detection is on, if the solar modules generate power and **SolarAmp mini** starts charging the battery, the load will be turned off even during timer working.

## 5-4 Rate Timer



**SolarAmp mini** rate timer is different from a traditional night-light timer. The load turn-on time set by a rate (%) of night length. Even if the night length is changed seasonally, the load turn-off time will be approximate at the same time. There is no need to reset the timer setting as seasons change.

## 6. LED Indicators

### 6-1 Normal Status

STATUS LED		ERROR LED	
Blink-time	Description	Blink-time	Description
1	Battery Level Low	1	LVD (Load OFF)
2	Battery Level Middle	2	Battery Error
3	Battery Level Full	3	PV Error
		4	LVD & PV Error

### 6-2 Setting Status

MODE LED		STATUS LED			
Blink-time	Description	Blink-time	Description		
			Type	Charging Volt	Float Volt
1	Battery Type Selection	1*	Sealed	14.1Vdc	13.7Vdc
		2	Flooded	14.4Vdc	13.7Vdc
		3	AGM	14.3Vdc	13.3Vdc
		4	Gel	14.0Vdc	13.7Vdc
2	LVD Voltage Compensation	1*	0V (No Compensation)		
		2	-0.1V		
		3	-0.2V		
		4	+0.1V		
		5	+0.2V		
3	Night Detection Setting	1*	Night Detection OFF (Load is always ON)		
		2	Night Detection ON (Dusk-to-Dawn)		
		3	Night Detection ON with Normal Timer		
		4	Night Detection ON with Rate Timer		
4	Timer Detail Setting		Normal Timer	Rate Timer	
		1*	6 hours	40%	
		2	8 hours	50%	
		3	10 hours	60%	
		4	12 hours	70%	
		5	14 hours	80%	

\*Factory Default Setting



# 7. Troubleshooting

## 7-1 Lighting ERROR LED

ERROR LED	Possible Cause	Solution
LVD	Battery voltage is low.	Charge the battery. The load recovers when battery voltage more than 12.5V.
Battery Error	Battery is not connected. Battery voltage is too low or too high. Short circuit. Battery is deeply discharged.	Check the wire connection and battery voltage.
PV Error	PV voltage is lower than battery voltage. In the night.	This error is on in the night and automatically recovers when PV generating power. *1
LVD&PV	Both LVD and PV error occurred.	See the solutions above.

\*1 The PV Error will remain for about one minute after PV began generating power.

## 7-2 FAQs

Problem	Possible Cause	Solution
Battery is not charging	PV voltage is lower than battery voltage. Battery is fully charged (more than 13V).	Check the PV and battery voltage. If the voltage is normal, it may take about 3 minutes to start charging.
Load is not operating properly	LVD	Even If the battery voltage is over 11.5V, once the controller become LVD, the load will NOT recover unless the battery voltage be over 12.5V.
LED does not light	Normal	To save the power, the LED is off in usual. Push the SELECT SW, the LED lights for one minute.
Early Start Lighting Function is not operating.	First day of installation. Setting was changed.	The function works in next 1 or 2 days after system installed or setting changed. If the surroundings suddenly become dark due to the bad weather or shadow, etc., <b>SolarAmp mini</b> will detect the voltage from the PV and turn on the load as a normal controller.



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