



Solar Charge Controller

Solar Amp mini

SA-MN05

User's Manual

Ver. 2.10E



DENRYO CO., LTD.

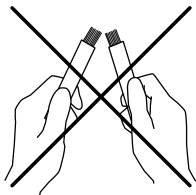
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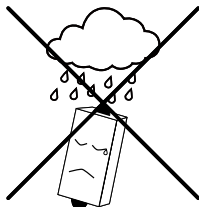
Thank you for purchasing the **SolarAmp mini** solar charge controller. This manual contains important safety, installation and operating instructions for the **SolarAmp mini** solar charge controller in order to prevent the users from any damage. Make sure to read all of the instructions and cautions in the manual before beginning installation.

1. Safety Information

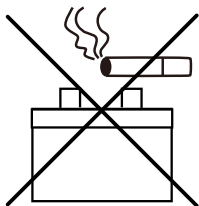
1-1 : Do NOT short circuit



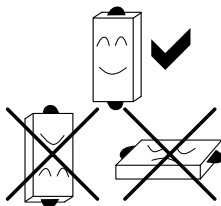
1-2 : Protect from direct rain



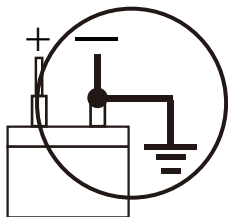
1-3 : Explosion hazard



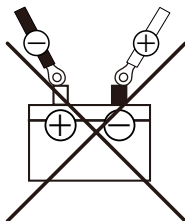
1-4 : Mounting direction



1-5 : Negative earth ground



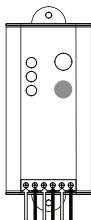
1-6 : Do NOT reverse polarity connection



3. Connection

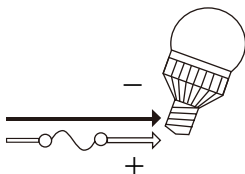
3-1 : Connect wires to
SolarAmp mini first

Screw tightly not to loose.



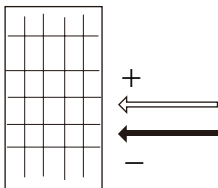
3-2 : Connect to load

It is recommended to install
an external fuses (5A)
between controller and load.



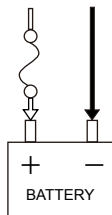
3-3 : Connect to PV

Cover the PV with cloth
not to generate electricity.

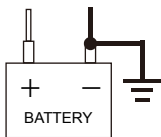


3-4 : Connect to battery

It is recommended to install
an external fuses (5A)
between controller and battery.

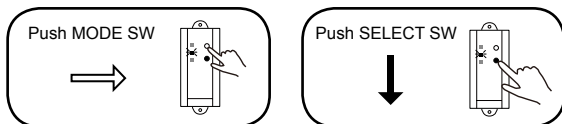


3-5 : Connect battery to earth ground

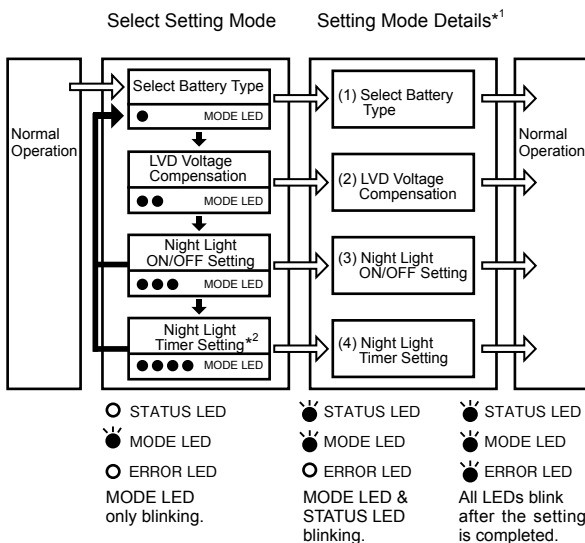


4. Operation

4-1 : Setting Switches



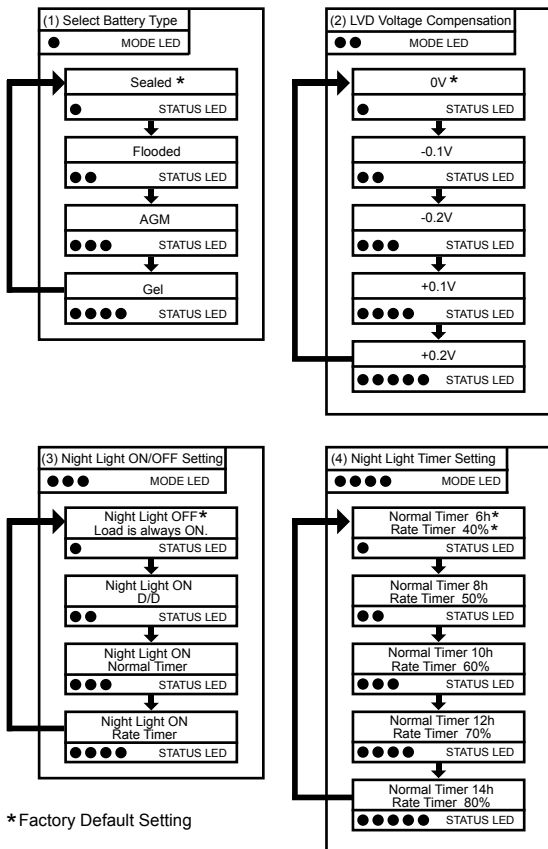
When the SW is pushed, mode will switch as illustrated below.
Confirm the set contents by checking MODE LED and STATUS LED blinking.



*¹ Setting mode details are described on the next page.

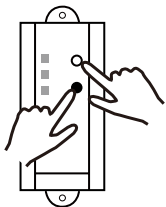
*² Night light timer should be available only when you choose timer setting or rate timer setting.

Setting Mode Details

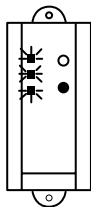


4-2 : Reset

(1)



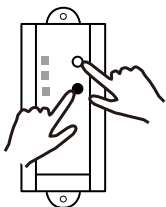
(2)



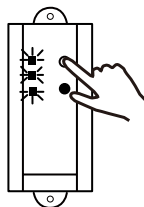
- (1) Push MODE SW and SELECT SW simultaneously.
- (2) Release your hands from both of the SWs than LED blink twice. Successfully reset will be completed.

4-3 : Factory default

(1)

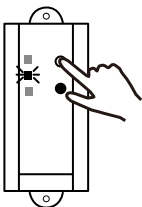


(2)

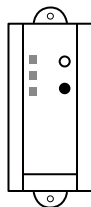


- (1) Push MODE SW and SELECT SW simultaneously.
- (2) Keep pushing MODE SW and release your hand from SELECT SW only.

(3)



(4)



- (3) MODE LED keeps to light during the MODE SW is pushed and hold for five seconds.
- (4) When MODE LED turned off, the factory default is completed.

5. LED Indications

5-1 : STATUS LED and ERROR LED during normal operation

STATUS LED	STATUS Descriptions	ERROR LED	ERROR Descriptions
●	Battery Level Low	●	LVD (LOAD OFF)
● ●	Middle	● ●	Battery Error
● ● ●	Full	● ● ●	PV Error
		● ● ● ●	LVD & PV Error

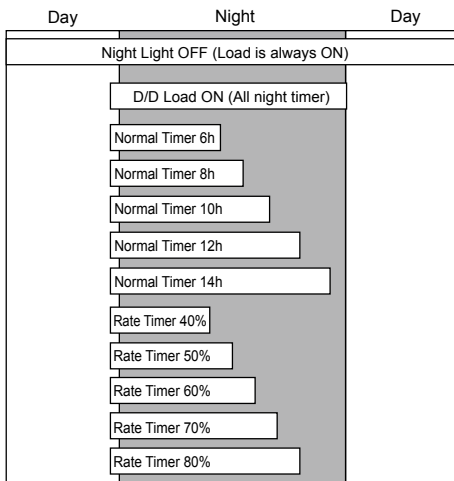
5-2 : MODE LED and STATUS LED during mode setting

MODE LED	MODE Description	STATUS LED	STATUS Description
●	Select Battery Type	●	Sealed* : Charging 14.1V Float 13.7V
		● ●	Flooded : Charging 14.4V Float 13.7V
		● ● ●	AGM : Charging 14.3V Float 13.3V
		● ● ● ●	Gel : Charging 14.3V Float 13.7V
● ●	LVD Voltage Compensation	●	0V*
		● ●	-0.1V
		● ● ●	-0.2V
		● ● ● ●	+0.1V
		● ● ● ● ●	+0.2V
● ● ●	Night Light ON/OFF Setting	●	Night Light OFF* Load is always ON
		● ●	Night Light ON D/D(Load ON All night)
		● ● ●	Night Light ON Normal Timer
		● ● ● ●	Night Light ON Rate Timer
● ● ● ●	Night Light Normal Timer or Rate Timer Setting	●	Normal Timer 6h* Rate Timer 40%*
		● ●	Normal Timer 8h Rate Timer 50%
		● ● ●	Normal Timer 10h Rate Timer 60%
		● ● ● ●	Normal Timer 12h Rate Timer 70%
		● ● ● ● ●	Normal Timer 14h Rate Timer 80%

*Factory Default Setting

6. Night Light Timer

6-1 : Multi Timer



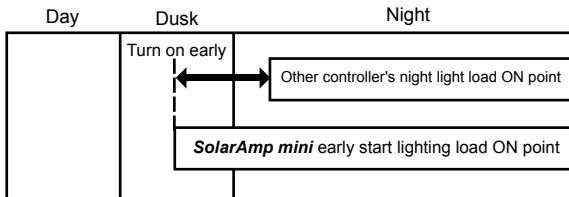
Four Operation Modes

MODE	Description
Night Light OFF	Load is always ON.
Night Light ON D/D	Load will turn on between dusk time and sunrise.
Night Light ON Normal Timer	Customize setting hours 6, 8, 10, 12, 14.
Night Light ON Rate Timer	Choose the rate of night time 40%, 50%, 60%, 70%, 80%.

Load Test Method

When the Night light mode is ON and push SELECT SW more than two seconds, the load will turn on. When you release your hand from SW, the load will turn off. (This method is effective only before the load turn on in the day time).

6-2 : Early Start Lighting Function



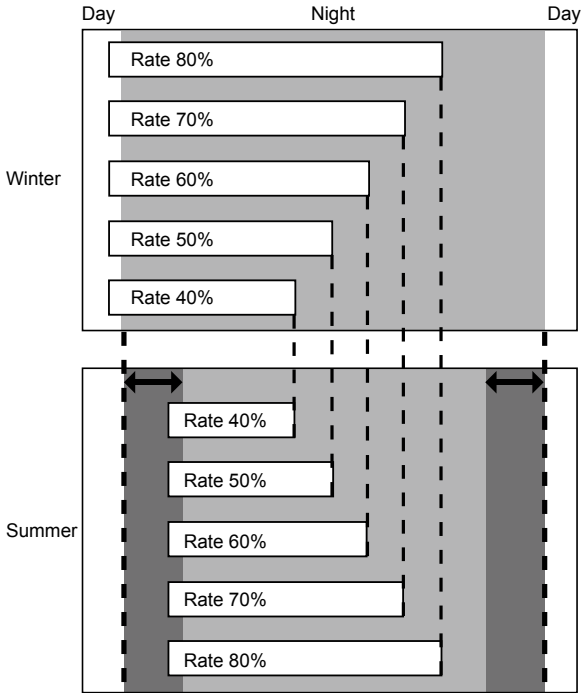
SolarAmp mini has the early start lighting function. The load will start to turn on from dusk. This function will operate the following day after installing **SolarAmp mini** at the earliest.

Soon after installing or sudden bad weather, the load will start to turn on by the condition of PV voltage. The conditions are as described.

- (1) Solar voltage will be less than 10V.
- (2) After that, solar voltage will be less than 8V.

For this reasons, you will need to wait for more than 3 minutes to start to light at the night from charging the battery.

6-3 : Rate Timer Function



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

7. Troubleshooting

7-1 : Lighting ERROR LED

LVD : The battery voltage is low. Please charge with the battery 12.5V or more until becoming it.

Battery : The cause is as follows.

- Battery is not connected
 - Battery is low or too high voltage
 - Short-circuited
 - Deeply discharged battery cannot charge with recovery
- Please check the wire connection and battery voltage for the system.

PV : The PV voltage is lower than battery voltage. This error will remain for about one minute after PV begins to generate.

There is no problem though this error occurs during the night.

LVD&PV : LVD and the PV error occur at the same time.

7-2 : Battery is not charged

SolarAmp mini charge controller will not charge unless the PV voltage is higher than battery voltage. It takes approximately 3 minutes to start charging from PV voltage. In the event of a battery fault the charge controller will not charge. On the other hand, the charge controller will not charge when battery is fully charged or battery voltage more than 13V.

7-3 : Load does not operating properly

Please check LVD status of solar controller. Even If the battery voltage is over 11.5V, once the controller become LVD, the load will NOT turn on unless the battery voltage be over 12.5V.

7-4 : LED does not light

SolarAmp mini automatically turns off LED. LED lights for one minute only when SELECT SW is pushed.

7-5 : Early start lighting function does not operate

The Early start lighting function does not operate on that day when the installation first day and the setting were changed.

Besides, when it gets dark suddenly by the bad weather, it begins to light detecting from the power generation of the solar battery as well as an usual controller.

8. Specifications

Model	SA-MN05
System Voltage	12 V
Max. input Voltage	25 V
Max. input Current	5 A
Max. load Current	5 A
Min. input battery Voltage	6 V
Grounding	Negative ground
Self-consumption Current	1 mA
Reverse Polarity Protected	Fuse : 10 A
Operation Temperature	- 20 ~ + 60 °C
Storage Temperature	- 30 ~ + 70 °C
Humidity	5 ~ 95 %RH (non-condensing)
Dimensions (D x W x H)	20 x 50 x 120 mm
Weight	105 g
Wire Size	16AWG (1.3 mm ²) ~ 22AWG (0.33 mm ²)
Battery Type	Sealed, Flooded, AGM, Gel
Charging Voltage	Sealed Battery : 14.1 V
	Flooded Battery : 14.4 V
	AGM Battery : 14.3 V
	Gel Battery : 14.0 V
Load Disconnect Voltage	11.5 V (±0.2 V)
LVD Reconnect	12.5 V (±0.2 V)
Charging Algorithm	3-stage (Bulk, Absorption, Float)
Temperature Coefficient	-30 mV/°C

9. Certifications



RoHS

10. Glossary

PV : Photovoltaics Module (Solar Panel)

LVD : Low Voltage Disconnect

D/D : Dusk to Dawn

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