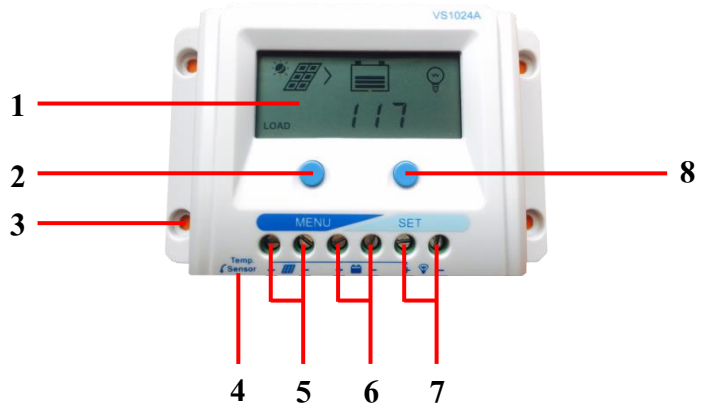
Solar Charge Controller NSC1024A

1. Overview

Thank you for selecting the NSC1210D series common positive solar charge controller. The NSC1210D controller is a PWM charge controller with built in LCD display that adopts the most advanced digital technique. The multiple load control modes enable it can be widely used on solar home system, traffic signal, solar street light, solar garden lamp, etc. The features are listed below :

- 3-stage intelligent PWM charging : Bulk, Boost/Equalize, Float
- Support 3 charging options : Sealed, Gel, and Flooded
- LCD display design, dynamically displaying device's operating data and working condition
- Multiple load control modes
- Energy statistics function
- Battery temperature compensation function
- Extensive Electronic protection

2. Product Features



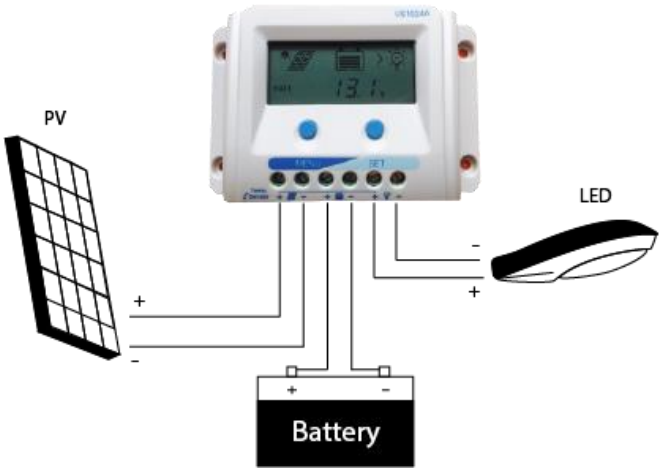
1	LCD	5	PV terminals
2	MENU Button	6	Battery Terminals
3	Mounting hole size Ø4.5	7	Load Terminals
4	RTS* Port	8	SET Button

***Accessory :** Remote Temperature Sensor

Acquisition of battery temperature for undertaking temperature compensation of control parameters, the standard length of the cable is 3m (length can be customized). The RST300R47K3.81A connects to the port (4") on the controller.

NOTE : Unplug the RST, the temperature of battery will be set to a fixed value 25ºC

3. Wiring



Connection diagram

(1) Connect components to the charge controller in the sequence 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 will be reserved.

(2) After power on the controller, check the LCD on. Otherwise please refer to chapter 6. Always connect the battery first, in order to allow the controller to recognize the system voltage.

(3) The battery fuse should be installed as close to battery as possible. The suggested distance is within 150 mm.

(4) The controller is a positive ground controller. Any positive connection of solar, load or battery can be earth grounded as required.

NOTE : Please connect the inverter or other load that it has the large start current to the battery rather than to the controller, if the inverter or other load is necessary.

4. Operation

4.1 Button Function

Button	Function
MENU button	• Browse interface • Setting parameter
SET button	• Load ON/OFF • Clear error • Enter into set mode • Save data

4.2 LCD Display

➢ **Status description**

Item	Icon	Status
PV array		Day
		Night
		No charging
	>>>	Charging
	PV	PV Voltage, Current, Power
Battery		Battery capacity, In Charging
	BATT.	Battery voltage, current, temperature
	BATT. TYPE	Battery type
Load		Load ON
		Load OFF
	LOAD	Load Voltage, Current, Load mode

➢ **Browse interface**

NOTE :

1) When no operation, the interface will be automatic cycle, but the follow two interfaces not be display.

2) Accumulative power zero clearing : Under PV power interface, press SET button and hold on 5s then the value blink, press SET button again to clear the value.

3) Setting temperature unit : Under battery temperature interface, press SET button and hold on 5s to switch.

➢ **Fault Indication**

Status	Icon	Description
Battery over discharged		Battery level shows empty, battery frame blink, fault icon blink
Battery over voltage		Battery level shows full, battery frame blink, fault icon blink
Battery overheating		Battery level shows current value, battery frame blink, fault icon blink
Load failure		Load overload①, Load short circuit

① When load current reaches1.02-1.05 times 1.05-1.25 times, 1.25-1.35 times and 1.35-1.5 times more than nominal value, controller will automatically turn off loads in 50s, 30s, 10s and 2s respectively.

4.3 Load mode setting

Operating steps :

Under load mode setting interface, press SET button and hold on 5s till the number begin flashing, then press MENU button to set the parameter, press SET button to confirm.

1**	Timer 1	2**	Timer 2
100	Light ON/OFF	2 n	Disabled
101	Load will be on for 1 hour since sunset	201	Load will be on for 1 hour before sunrise
102	Load will be on for 2 hours since sunset	202	Load will be on for 2 hour before sunrise
103-113	Load will be on for 3~13 hours since sunset	203-213	Load will be on for 3~13 hour before sunrise
114	Load will be on for 14 hours since sunset	214	Load will be on for 14 hour before sunrise
115	Load will be on for 15 hours since sunset	215	Load will be on for 15 hour before sunrise
116	Test mode	2 n	Disabled
117	Manual mode (default load ON)	2 n	Disabled

NOTE: Please set Light ON/OFF, Test mode and Manual mode via Timer1. Timer2 will be disabled and display "2 n".

4.4 Battery Type

➢ **Operating Steps**

Under Battery Voltage interface, press SET button and hold on 5s then enter into the interface of Battery type setting. After choosing the battery type by pressing MENU button, waiting for 5s or pressing SET button again to modify successfully.

➢ **Battery Type**

1. Sealed (Default) **2. Gel** **3.Flooded**

NOTE: Please refer to the battery voltage parameters table for the different battery type.

5. Protections

- PV Short Circuit

When PV short circuit occurs, the controller will stop charging. Clear it to resume normal operation.

- PV Reverse Polarity

Fully protection against PV reverse polarity, correct the wire connection to resume normal operation.

- Battery Reverse Polarity

Fully protection against battery reverse polarity, correct the wire connection to resume normal operation.

Warning : Shock Hazard!

When the battery is reverse, the load will appear the equal and reverse polarity voltage to battery.

- Battery over voltage

When the battery voltage reaches to the set point of Over Voltage Disconnect Voltage, the controller will stop charging the battery to protect the battery from being over charged to break down.

- Battery over Discharge

When the battery voltage reaches to the set point of Low Voltage Disconnect Voltage, the controller will stop discharging the battery to protect the battery from being over discharged.

- Battery Overheating

The controller detect the battery temperature through the external temperature sensor. If the battery temperature exceeds 65ºC, the controller will automatically start the overheating protection to stop working and recover below 50ºC.

- Load Overload

Load will be switched off when 1.05 times rated current overload happens. Controller will automatically attempt to reconnect load for 5 times. It overload protection still exist after controller's 5 times attempts, user have to reduce load appliance, then press the SET button or repower the controller or wait for one night-day cycle (night time>3 hours).

- Load Short Circuit

Load will be switched off when load short circuit (≥4 times rated current) happens. Controller will automatically attempt to reconnect load for 5 times. If short circuit protection still exist after controller's 5 times attempts, user have to clear short circuit, then press the SET button or disconnect and restart the controller or wait for one night-day cycle (night time>3 hours).

- Damaged Remote Temperature Sensor

If the temperature sensor is short-circuited or damaged, the controller will be charging or discharging at the default temperature 25ºC to prevent the battery damaged from overcharging or over discharged.

- Controller Overheating

If the temperature of the controller heat sinks exceeds 85ºC, the controller will automatically start the overheating protection and recover below 75ºC.

- High Voltage Transients

PV is protected against small high voltage surge. In lightning prone areas, additional external suppression is recommended.

6. Troubleshooting

Faults	Possible reasons	Troubleshooting
The LCD is off during daytime when sunshine falls on PV modules properly	PV array disconnection	Confirm that PV wire connections are correct and tight
Wire connection is correct, LED not display	1. Battery voltage is lower than 9V 2. PV voltage is less than battery voltage	1. Please check the voltage of battery. At least 9V voltage to activate the controller 2. Check the PV input voltage which should be higher than battery's
▲  Interface blink	Battery over voltage	Check if the battery voltage is higher than OVD point (over voltage disconnect voltage), and disconnect the PV.
▲  Interface blink	Battery over discharged	When the battery voltage is restored to or above LVR point (low voltage reconnect voltage), the load will recover
▲  Interface blink	Battery overheating	The controller will automatically turn the system off. But while the temperature decline to be below 50 ºC, the controller will resume.
▲  Interface blink	Over load or Short circuit	Please reduce the number of electric equipment or check carefully loads connection.

7. Technical Specifications

Item	VS1024A
Nominal system voltage	12/24 VDC Auto
Battery input voltage range	9~32V
Rated charge current	10A
Max. PV open circuit voltage	50V
Temperature compensation coefficient	-3mV / ºC / 2V (25ºC)
Self-consumption	≤8.1mA(12V) ; ≤6.5mA(24V)
Charge circuit voltage drop	≤0.29V
Discharge circuit voltage drop	0.16V
LCD temperature range	-20ºC ~ +55ºC
Working environment temperature	-25ºC ~ +55ºC*
Humidity range	≤95% (N.C.)
Enclosure	IP30
Grounding	Common Positive
Overall dimension	132x84.6x39.7 mm.
Mounting dimension	120x56 mm.
Mounting hole size	Ø4.5 mm.
Terminals	4 mm^2
Net weight	0.18 kg

*** If the controller is working under high temperature environment, please derate capacity in service**

Battery voltage Parameters (parameters is in 12v system at 25ºC, please use double value in 24V.)

Battery charging setting	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 Volt. Warning Volt.	12.0V	12.0V	12.0V
Low Volt. Disconnect Volt.	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

8. Disclaimer

1) Damage from improper use or use in an unsuitable environment.

2) PV or load current, voltage or power exceeding the rated value of controller.

3) User disassembly or attempted repair the controller without permission.

4) The controller is damaged due to natural elements such as lighting.

5) The controller is damaged during transportation and shipment.

Any changes without prior notice! Version number: V1.0

Northern Sunshine Co.,Ltd.

82/33 Soi Rattanathibet 26/1 Bangkrasore , Maung Nonthaburi , Nonthaburi 11000

Tel. 02-9657588 , 081-8465426 , 086-3411861 Fax. 02-9657599

E-Mail : sales@nsthai.com Website : http://www.nsthai.com