Solar Charge Controller

1.Description of Function

LAT-NL series intelligent solar controller is especially for solar photovoltaic power generation system and solar street light system.

It comes with a number of outstanding features, such as:

- 12V/24V automatic recognition
- Clear readable display of charge/discharge and error description
- Four stages charge way: fast, boost, equal, float
- Temperature compensation
- Low voltage disconnected reulated by state of charge
- Programmable nightlight function
- Max. 16mm² binding clamp
- Full automatic electronic protect function

This manual provides some important recommendations related to the controller, including installation, use, programming and fault exclusion.

2.Safety instructions and waiver of liability

2.1 Safety

①The solar charge controller may only be used in PV systems in accordance with this user manual and the specifications of other modules manufacturers. No energy source other than a solar generator may be connected to the solar charge controller.

②Batteries store a large amount of energy, never short circuit a battery under all circumstances. We strongly recommend connecting a fuse directly to the battery to protect any short circuit at the battery wiring.

③Batteries can produce flammable gases. Avoid making sparks, using fire or any naked flame. Make sure that the battery room is ventilated.

④Avoid touching or short circuiting wires or terminals. Be aware that the voltages on special terminals or wires can be as much as twice the battery voltage. Use isolated tools, stand on dry ground, and keep your hands dry.

⑤Keep children away from batteries and the charge controller.

2.2 Liability Exclusion

The manufacturer shall not be liable for damages, especially on the battery, caused by use other than as intended or as mentioned in this manual or if the recommendations of the battery manufacturer are neglected. The manufacturer shall not be liable if there has been service or repair carried out by any unauthorized person, unusual use, wrong installation, or bad system design.

3.Starting up the controller

3.1Self Test

As soon as the controller is supplied with battery, it starts a self test routine. Then the display changes to normal operation.

3.2System Voltage

The controller adjusts itself automatically to 12V or 24V system voltage. As soon as the battery voltage at the time of start-up is within 10V to 16V,the controller implies a 12V system, else if the battery voltage is within 20V to 30V,the controller implies a 24V system.

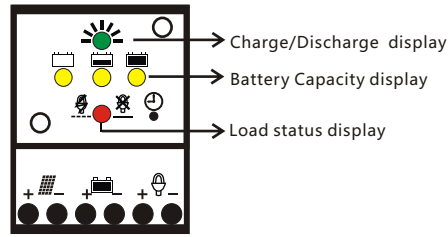
If the battery voltage is not within the normal operating rang(ca.10 to 16V or ca.20 to 30V)at start-up, a status display according to the section **7.2 Error description** occur.

3.3Battery Type

The LAT-NL series controller applies to Liquid and Gel battery, the factory default setting is suitable for liquid battery.

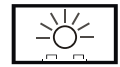
4.Display Functions

The controller is equipped with 5 LEDS.



In normal operation,the controller shows charge or discharge status、battery capacity and load status.

4.1Charge display(Green LED)：



Solar array supplies electricity (LED is on)

Solar array does not supply electricity (LED is off)

4.2Status of charge display(Yellow LED):

<25%

25-75%

>75%

The percentage corresponds to the available energy until low voltage disconnect in relation to a fully charged battery.

4.3Load status display(Red LED)：

In case of deep discharge or overload/short-circuit of load, the load output is switched off.

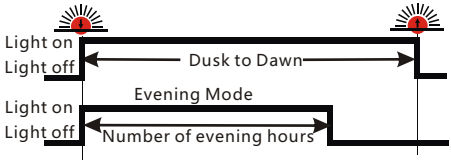
Normal operation (LED is off)

Low voltage disconnect(LED is on)

Overload or short-circuit of load(LED is flashing)

5.Night light Function

The charge controller has a load terminal which is prepared for nightlight operation and switches on for a selectable number of hours from the dusk.
There are 2 modes available:
Dusk to Dawn and Evening Mode.



6.Programming Function

6.1Programming Nightlight Function

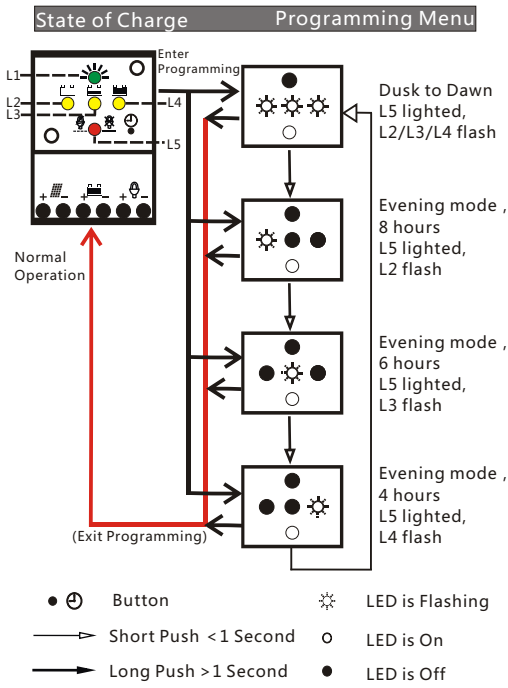
You enter the programming mode with a long push on the button. The programming menu structure is described on the follow.

All programming settings are stored in a non-volatile memory and remain stored even if the controller was dis-connected from the battery.

6.2Test Function

During the daytime the testing function can help the user to verify correct installation or for trouble shooting a system problem. Short pushing the button will light up the lamp which is connected to the load terminals.

The lights will be on in the day for 1 minute intervals. Within 1 minute the lights can be turned off via pushing button.



7.Safety Features and Error description

7.1 Safety features

	Solar terminal	Battery terminal	Load terminal
Reverse polarity	Protected *1	Protected *1	Protected *2
Short circuit	Protected	Protected *3	Switches off immediately
Over current	——	——	Switches off with delay
Reverse Current	Protected	——	——
Over voltage	Max.55V *4	Max. 40V	——
Under voltage	——	——	Switches off
Over temp.	switches off the load if the temperature reaches the set value.		

*1 Controller can not protect itself in a 24V system when polarity of battery or solar is reversed.
*2 Controller can protect itself, but loads might be damaged.
*3 Battery must be protected by fuse, or battery will be permanently damaged.
*4 The solar panel voltage should not exceed this limit for a long time as voltage protection is done by a varistor.

Warning: The combination of different error conditions may cause damage to the controller. Always remove the error before you continue connecting the controller.

7.2 Error description

Error	Display	Reason	Remedy
Loads are not supplied	Red LED is on	Battery is low	Load will reconnect as soon as battery is recharged
	Red LED is flashing	Over current/ short circuit of loads	Switch off all loads. Remove short circuit.
Battery is empty after a short time	Red LED is on	Battery has low capacity	Change battery
Battery is not being charged during the day	Green LED is off	Solar array faulty or wrong polarity	Remove faulty connection/ reverse polarity
over voltage protection	Red and Yellow LED (the right side) are lighted	Battery voltage too high (>15.5V/31V)	Check if other sources overcharge the battery. If not, controller is damaged.
		Battery wires or battery fuse damaged, battery has high resistance	Check battery wires,fuse and battery.
Does not recognize the system voltage	All LED Lighted	The battery voltage is not within the normal operating rang at start-up	Charge or discharge the battery to make the voltage within the normal range

8.Low Voltage Disconnect Function

The controller uses state of charge to protect the battery form being deeply discharged:
11.2V/22.4V~11.8V/23.6V.
Disconnect at 11.2V/22.4V(at nominal load current) up to 11.8V/23.6V(at no load current).

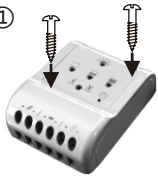
1.If the controller goes into low voltage protection, it will restore only when the battery being recharged and the voltage reaching the reconnect voltage.
2.Around oblique line value separately on behalf of 12V and 24V system's value.

9.Mounting and Connecting

The controller is intended for indoor use only. Protect it from direct sunlight and place it in a dry environment. Never install it in humid rooms(like bathrooms).
The controller measures the ambient temperature to determine the charging voltage. Controller and battery must be installed in the same room.
The controller warms up during operation, and should therefore be installed on a non flammable surface only.

Remark: Connect the controller by following the steps described below to avoid installation faults.

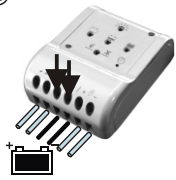
①



Mount the controller to the wall with screws that fit to the wall material.
Use screws with max.4mm shaft and max.7.5mm head diameter, no counter sunk.

Mind that the screws have to carry also the force applied by the wiring.

②



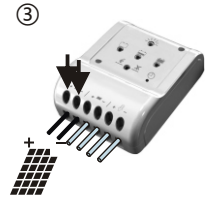
Connect the wires leading to the battery with correct polarity. To avoid any voltage on the wires, first connect the controller, then the battery. We strongly recommend connecting a fuse directly to the battery to protect any short circuit at the battery wiring.

The fuse must take the charge controller nominal current :
LAT05-NL: 20A;
LAT10/15-NL: 30A;
LAT20-NL: 40A.
Mind the recommended wire length:
Min 30cm to max 100cm.

The wire size:
LAT05-NL: min2.5mm^2
LAT10-NL: min6mm^2
LAT15/20-NL: min10mm^2

Warning: If the battery is connected with reverse polarity, the load terminals will also have the wrong polarity. Never connect loads during this condition.

③

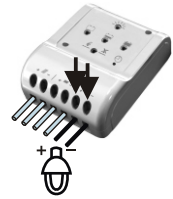


Connect the wires leading to the solar array with correct polarity, to avoid any voltage on the wires, first connect the controller then the Solar array.

Mind the recommended wire size :
LAT05-NL: min 2.5 mm^2
LAT10-NL: min 6 mm^2
LAT15/20-NL: min 10 mm^2

Remark: Place positive and negative wire close to each other to minimize electromagnetic effects. Solar panels provide voltage as soon as exposed to sun light .Mind the solar panel manufacturer' s recommendations in any case.

④

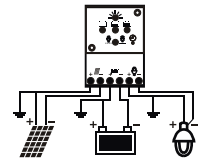


Connect the wires leading to the loads with correct polarity.
To avoid any voltage on the wires, first connect the wire to the load, then to the controller.

Mind the recommended wire size:
LAT05-NL:min 2.5 mm^2
LAT10-NL:min 6 mm^2
LAT15/20-NL:min 10 mm^2

10.Grounding the Solar System

Be aware that the positive terminals of the controller are connected internally and therefore have the same electrical potential. If any grounding is required always do this on the positive wires.



Remark: If the device is used in a vehicle which has the battery negative on the chassis, loads connected to the controller must not have an electric connection to the car body, otherwise the Low Voltage disconnect and electronic fuse functions of the controller are short circuited.

11.Technical Data

Model	LAT05-NL	LAT10-NL	LAT15-NL	LAT20-NL
System voltage	12V/24V automatic recognition			
Max. solar current or load current	5A	10A	15A	20A
Fast voltage	14.0V/28.0V(25℃)			
Boost voltage	14.5V/29.0V (25℃)			
Equalization voltage	14.8V/29.6 V (25℃)(Liquid)			
Float voltage	13.7V/27.4 V (25℃)			
Load disconnect voltage	11.2~11.8V/22.4~23.6V			
Load reconnect voltage	12.5V/25.0V			
Working time during night	Dusk to Dawn mode、4、6、8hours (Programmable)			
Battery type	Liquid、Gel			
Temperature Compensation	-4.17 mV/K per cell(Boost, Equalization); -3.33 mV/K per cell(Float)			
Max. solar voltage	55V			
Max. battery voltage	40V			
Over voltage protection	15.5V/31.0V			
Dimensions/ Weight	81*102*37 / 150g			
Wire size	16mm²(AWG#6)			
Own consumption	4mA			
Ambient temperature	-40 ~ +60 ℃			
Degree of protection	IP22			

Subject to change without notice. Version: DC13