SL Series

SL2410/SL2420 Series
Smart Solar Charge Controller
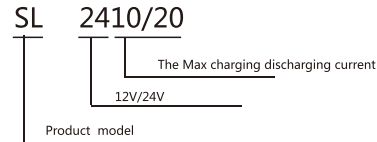
Instruction Manual

Version: 1.02
The above information is subject to change without prior notice.
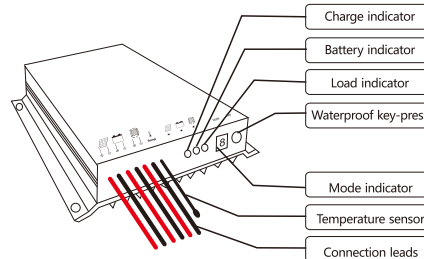
Main Features

1. The design of IP68 waterproof level and aluminum shell helps effectively prevent erosion.
2. 12 V/24 V system voltage.
3. LED numeric display and waterproof keys are easy to use.
4. An upgraded 3-stage PWM charging algorithm applies an equalizing charge to the battery every week, effectively preventing the battery from non-equalization and sulfuration and therefore extending the battery's service life.
5. Up to 5 load working modes facilitate the product's application to different types of road lamps and monitoring devices.
6. Charging program options are available for sealed, GEL and flooded lead-acid batteries and ternary-material lithium and lithium iron phosphate batteries.
7. An external temperature sensor helps deliver high-precision temperature compensation.
8. Parameter settings of power-down saving functions eliminate the trouble of repeated settings, making operation easy and convenient.
9. Various kinds of state indicators.
10. Overcharge, over-discharge and overload protection, as well as short-circuit and reverse-connection protection.
11. TVS lighting protection.

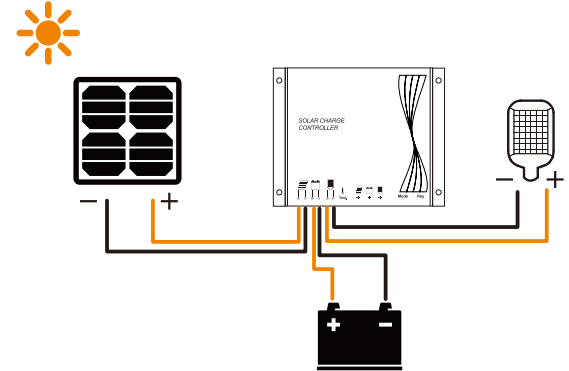## Installation and Wiring

1. Mode identification

SL   2410/20

The Max charging discharging current

12V/24V

Product model

2. Appearance picture is as below

- Charge indicator
- Battery indicator
- Load indicator
- Waterproof key-press
- Mode indicator
- Temperature sensor
- Connection leads

3. Wiring diagram is as below

• The SL series controller can work under a system voltage of 12 V or 24 V. In actual practice, connect the battery first, and the controller starts operation after automatically recognizing the battery voltage. For a 12 V system, the nixie tube displays "0. ". For a 24 V system, the nixie tube displays "1. " and battery indicator lights up; otherwise, check whether the connection is correct.
• Connect the solar panel's "+" and "-" poles. If sunlight is present, the solar panel indicator lights up; otherwise, check whether the connection is correct.
• Connect the load's "+" and "-" poles. Connect the load leads to the controller's load output terminal, and the current shall not exceed the controller's rated current.
The wiring is shown below:

Installation and wiring
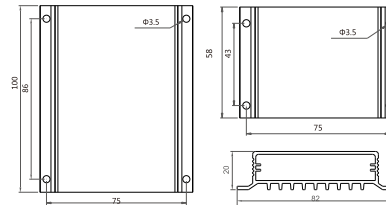
Installation of controller should be stable and dimensions are as follows:

Overall dimension:
82×58×20(mm)/2410
82×100×20(mm)/2420
Installation dimension:
43×75(mm)/2410
86×75(mm)/2420
Installation hole diameter:
3.5(mm)

Suggestions for use

1) When the controller is powered on, it automatically recognizes the battery voltage. In practical use, connect the battery first, and make sure the connection is sound and reliable.
2) As the controller generates heat during operation, you are advised to install it in an environment with good ventilation conditions.
3) The controller measures the ambient temperature and makes compensation to battery charging based on the measurement. As long as actual conditions permit, place the battery and the controller in the same environment.
4) Choose cables with large enough capacity for connection, in case too much loss incurred on the lines causes the controller to misjudge.
5) The controller has a common positive pole inside. If grounding is needed, ground the positive pole.
6) It's important to fully charge the battery regularly. At least one full charging in every month is recommended, and failure to do that may cause permanent damage to the battery. Only when inflow energy outpaces outflow energy can the battery be charged full. Users shall bear this in mind when configuring the system.

Status indications

LED lamp	Indications	Status	Functions
	Charging	Steady on	Solar panel of voltage
		Steady off	Solar panel of no voltage
		Slow flashing	Charging in process
		Quick flashing	System over voltage
	Battery	Steady on	Normal battery function
		Steady off	Battery not connected
		Slow flashing	Battery under voltage
		Quick flashing	Battery over discharged
	Load	Steady on	Load turned on
		Steady off	Load turned off
		Slow flashing	Overload protection
		Quick flashing	Short-circuit protection

Mode Description and Settings Table

The SL2410/20 series controller has 5 working modes, and specific settings are listed in the table below.
1.Pure light control (0): When sunlight disappears and light intensity drops to the starting point, the controller initiates a 1-minute delay to confirm the starting signal, and then switches on the load for operation according to parameter settings. When sunlight emerges and light intensity reaches the starting point, the controller initiates a 1-minute delay to confirm the shutting-down signal, and then shuts down the output to stop the load's operation.
2.Light control + time control (1 to 4.): The starting process is the same as the pure light control. After operating for a preset period of time (settable from 1 to 14 hours), the load turns off automatically.
3.Manual mode (5.): In this mode, the user can switch the load on or off by operating the keys, regardless of daytime or night. This mode is designed for some specially purposed loads, and also used in the debugging process.
4.Debugging mode (6.): used for system debugging. With light signals, the load is shut off; without light signals, the load is switched on. This mode enables fast check of the correctness of system installation during installation and debugging.
5.Normal on mode (7.): The energized load keeps in output state, and this mode is suitable for loads which need 24-hour power supply.

LED Display	Mode	LED Display	Mode
0	Purely light-operated	9	Light control + time control (9 hours)
1	Light control + time control (1 hours)	0.	Light control + time control (10 hours)
2	Light control + time control (2 hours)	1.	Light control + time control (11 hours)
3	Light control + time control (3 hours)	2.	Light control + time control (12 hours)
4	Light control + time control (4 hours)	3.	Light control + time control (13 hours)
5	Light control + time control (5 hours)	4.	Light control + time control (14 hours)
6	Light control + time control (6 hours)	5.	Manual mode
7	Light control + time control (7 hours)	6.	Debugging mode
8	Light control + time control (8 hours)	7.	Normal On mode

Setting Methods

Load working mode setting method:
Press the key for no less than 3s, and the nixie tube begins to flash, indicating that the system can be adjusted. Release the key and every time you click it, the number displayed on the nixie tube changes to another. When the number becomes the one that corresponds to the mode selected by the user, wait until the nixie tube stops flashing or press the key again for no less than 3s to complete the setting.
Battery type setting method:
In the [5.] mode, press the key for 3s, and the nixie tube begins to flash. Release the key, and long press the key again. The three LED lights and nixie tube begin to flash. Then, click the key to choose a battery type by the numeric value displayed on the nixie tube. After that, long press the key. When the indicator lights stop flashing, the setting is complete and nixie tube exits to the [5.] mode.

Nixie Tube Display	Battery Type	Nixie Tube Display	Battery Type
1	Sealed lead-acid battery	5	4 strings of ternary-material lithium batteries
2	GEL lead-acid battery	6	7 strings of ternary-material lithium batteries
3	Flooded lead-acid battery	7	4 strings of lithium iron phosphate batteries
4	3 strings of ternary-material lithium batteries	8	8 strings of lithium iron phosphate batteries
		9	6 series ternary lithium battery

Problems and solutions

Symptoms	Causes and solutions
While sunlight is present, the solar panel indicator does not light up.	Check whether the solar panel is correctly connected and contact is good and reliable.
The solar panel charging indicator is flashing quickly.	System overvoltage. Check whether the battery voltage is too high.
The solar panel indicator is off and battery voltage is normal, but there is no output.	The load will be switched on automatically after 1 minutes.
The battery indicator does not light up.	The battery may be failing to supply power. Check whether the battery is correctly connected.

The battery indicator is flashing quickly, and there is no output.	The battery is over-discharged, and will recover when recharged adequately.
The load indicator is flashing slowly, and there is no output.	The load power exceeds the rated power. Reduce power-consuming devices and long press the key to recover.
The load indicator is flashing quickly, and there is no output.	The load is short-circuited. After removing the problem, long press the key or wait until it recovers automatically the next day.
The load indicator is steady on, and there is no output.	Check whether the power-consuming devices are connected correctly and reliably.
Other symptoms	Check whether the wiring is sound and reliable and system voltage (12 V/ 24 V) is correctly recognized.

Parameter Details

Battery type	Sealed	GEL	Flooded	Ternary-material lithium	Lithium iron phosphate
System current	10A;20A				
No-load loss	10mA/12V;13mA/24V				
Solar energy input voltage	< 55V				
System voltage	12V/24V Auto	12V/24V Auto	12V/24V Auto	3 and 4 strings: 12V system 7 strings: 24V system	4 strings: 12V system 8 strings: 24V system
Overvoltage protection	17.0V	17.0V	17.0V	4.2V*N+2.0V	3.65V*N+2.0V
Equalizing charging voltage	14.6V	—	14.8V	—	—
Boost charging voltage	14.4V	14.2V	14.6V	—	—
Floating charging voltage	13.8V	13.8V	13.8V	—	—
Overcharge voltage	—	—	—	4.2V*N	3.65V*N
Overcharge recovery	—	—	—	3.9V*N	3.4V*N
Boost charging recovery voltage	13.2V	13.2V	13.2V	—	—
Over-discharge recovery voltage	12.5V	12.5V	12.5V	3.3V*N	3.0V*N
Undervoltage	12.0V	12.0V	12.0V	3.2V*N	2.8V*N
Over-discharge voltage	11.0V	11.0V	11.0V	3.0V*N	2.5V*N
Temperature compensation	-4.0mv/℃/2V	-4.0mv/℃/2V	-4.0mv/℃/2V	—	—
Equalizing charging duration	1hour	—	1hour	—	—
Boost charging duration	4hours	4hours	4hours	—	—
Light controlled voltage	Light controlled on 5 V, light controlled off 6 V				
Light control judgment time	1min				
Overload and short-circuit protection	1.25 times of rated current: 30 s; 1.5 times of rated current: 5 s of overload protection; Over 3 times of rated current: short-circuit protection.				
Operating temperature	-35℃ to +65℃;				
Protection degree	IP68				
Weight	140g(10A)		300g(20A)		
Dimensions	82×58×20(mm)/10A		82×100×20(mm)/20A		

For the above parameters, the ambient temperature is 12 ℃, the system voltage is 12 V, and the lithium battery parameters are single-piece ones.