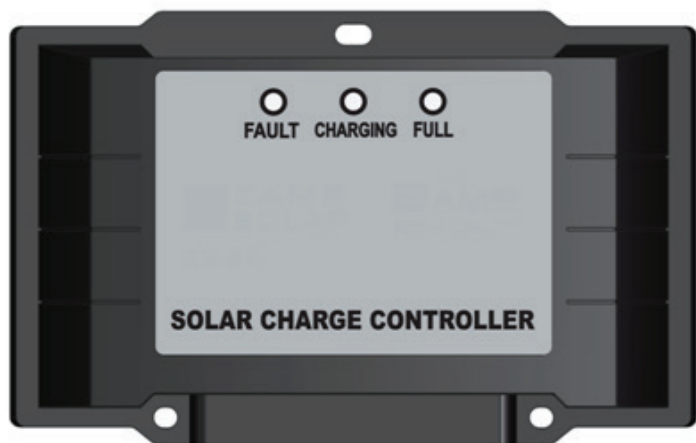


SRS12-12 SOLAR CONTROLLER USER MANUAL

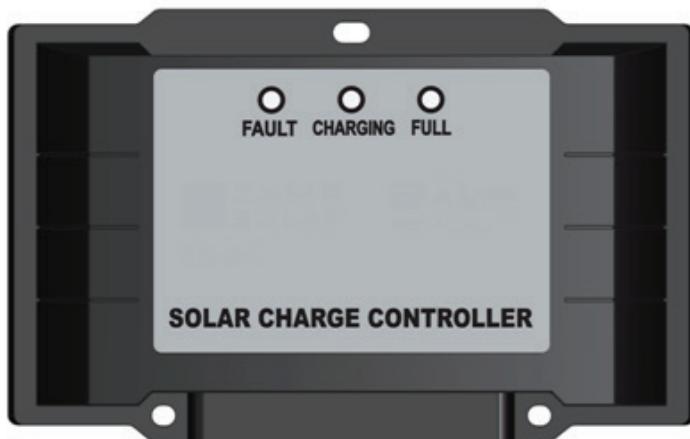


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1 FEATURES

- Advanced MCU with pulse width modulated (PWM) technology for high efficiency operation.
- Works with Gel, AGM, conventional lead-acid (WET) and Calcium Batteries.
- Contains a built-in regulator to prevent your battery from being over-charged. Overcharging occurs when the charge voltage is unregulated. This can result in premature battery failure.
- The built in regulator also prevents your battery from being under charged; in the solar energy field, battery undercharge always occurs, especially on some conventional lead-acid or calcium batteries. The unit provides an automatic equalization feature for deeply drained conventional lead acid battery or calcium batteries. This feature will run every 28 days. Equalization raises the battery voltage for a short period of time, in WET batteries this causes the electrolyte to bubble, effectively stirring it. This in turn reduces stratification which is the difference in acid concentration at different levels in the battery which can reduce performance.
- Can remain connected to the battery permanently to keep the battery fully charged by using a process called “floating”. Floating the battery stops it charging when the battery is full and automatically resumes charging the battery as required. This process will also reduce water loss and help prevent the battery from ‘drying out’.
- Protects your battery from discharging at night. Under low light or no light conditions the solar panel voltage could be less than the battery voltage. The unit contains a special circuit which prevents current flowing back from the battery and into the solar panel.
- Colored LED’s to easily indicate the charging status and battery conditions in addition to letting the user know if the system becomes faulty.
- Optional external battery temperature sensor.
- Protection against accidental misuse, these include reverse polarity, short circuit, high temperature and over voltage protection.
- Our circuit boards utilize conformal coating and plated terminals making them suitable to hostile environments.
- Waterproof and non-waterproof options.



*For use with 12V Solar Panel Only
Suitable for Solar panels rated at up to 180 Watts at 25°C*

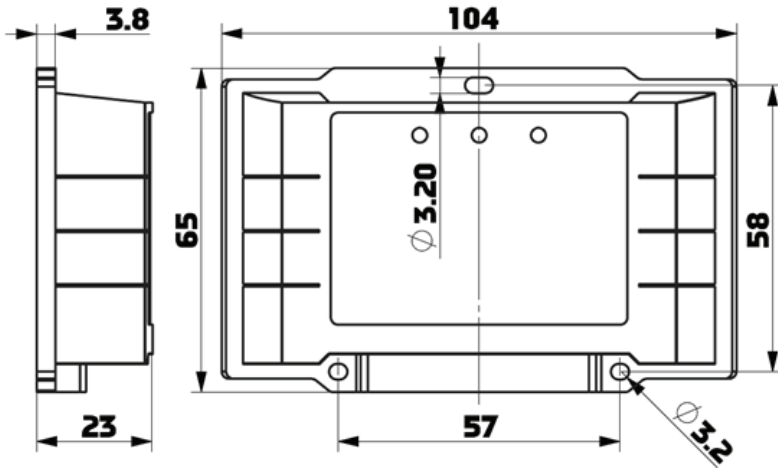
1.1 WARNING - IMPORTANT PLEASE READ

- This charger is designed for indoor use (non-waterproof type) or outdoor use (waterproof type).
- Do not disassemble the controller. If the unit requires repairing please take it to a qualified person.
- Lead-acid batteries can be dangerous. Ensure no sparks or flames are present when working near batteries.
- Eye protection should always be worn. Never short circuit the battery.
- Given sufficient light, solar panels always generate energy even when they are disconnected.
- Accidental 'shorting' of the terminals or wiring can result in sparks causing personal injury or a fire hazard. We recommend that you cover up the panel(s) with a soft cloth so you can block all incoming light during the installation. This will ensure that no damage is caused to the solar panel or battery if the wires are accidentally short circuited.
- Always install a battery fuse on each circuit including the solar controller.
- Ensure correct polarity when connecting the solar panel to the battery.

2 INSTALLATION

2.1 MOUNTING THE DEVICE

The quickest and easiest way to mount the unit is to use the three plastic spacers and self-tapping screws (supplied) and mount the unit to a flat surface.



Unit: mm

2.2 WIRING

Firstly we need to determine the correct wire size for the installation. This is largely determined by the lengths of wire required. Please refer to the wire size chart below to determine which gauge of wire is required. By following this size chart, you will ensure that you get the best performance possible from your solar regulator.

Total Cable Length (solar panel to controller plus controller to battery)	<3M	3~6M	6~9M	9~12M
Cable Size (AWG)	16	14	12	10

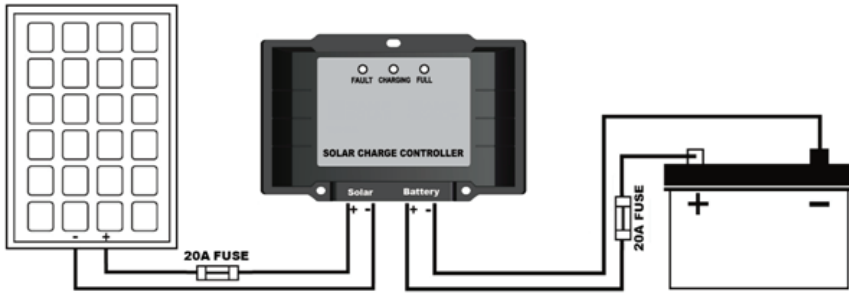
Wire Size Chart

To protect the battery and the solar panel, we strongly recommend that you place an inline fuse on the positive wire on both the solar and battery circuits. A 20A fuse should be used for the SRS12-12, this should be placed

as close to the battery/panel as possible.

The solar controller has 4 terminals which are clearly marked 'Solar' and 'Battery'. There is a 12V and earth (GND) terminal for each circuit.

Refer to the wiring diagram below.



Solar Regulator Wiring Diagram

1. Screw the wires tightly into the "Solar" terminal on the back of the controller and connect it to the Solar Panel as shown.
2. Screw the wires tightly into the "Battery" terminal on the back of the controller and connect it to the Battery as shown.

The Solar Controller will begin working as soon as the wiring has been completed.

2.3 BATTERY TYPE SETTING - VIA DIP SWITCH OR EXTERNAL WIRE

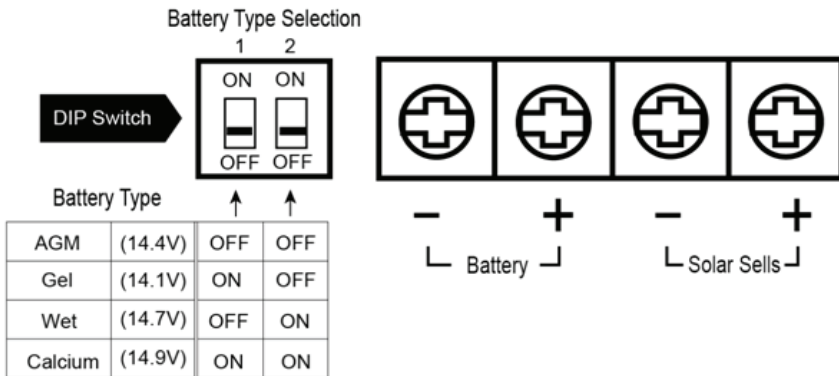
Please check your battery manufacturer's specifications to select the correct battery type. The unit provides caters to the four most common battery types: Gel, AGM, WET (conventional lead acid), and Calcium.

There is a DIP switch at the back of the solar charge controller, this DIP switch is used for presetting your battery type. Please refer to the figure below for selecting the correct DIP switch setting for your selected battery type; the factory default setting is the AGM battery type.

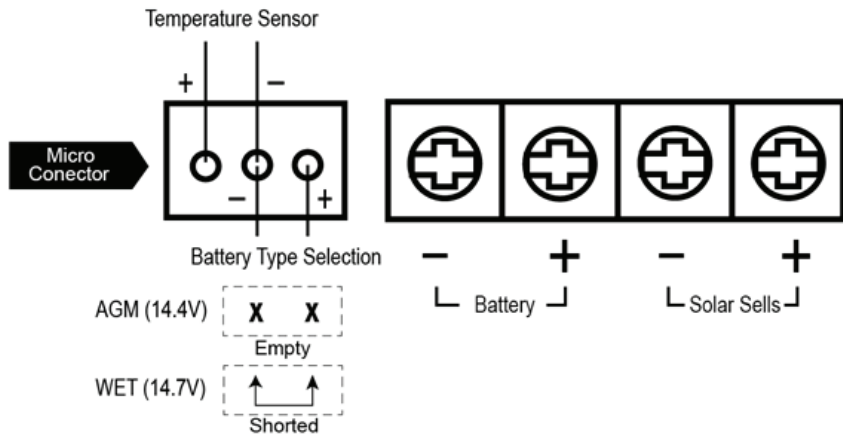
Alternatively we have an additional version that allows for units to be pre-configured for use with either AGM or WET battery types by using or omitting a jumper wire. Additionally these units can be configured to utilize temperature compensation by attaching the optional temperature sensor. If the external battery temperature sensor is connected to the battery the unit will optimize its charging performance in accordance with the detect-

ed battery temperature. The battery will stop charging all together if the detected temperature gets too high. Please see the additional figure below for wiring information, the factory default setting is for an AGM battery.

Note: Once the DIP switch setting or external wire connection is configured, do not change the DIP switch or external wiring; doing so may damage your battery.



Battery Type Setting Via DIP Switch



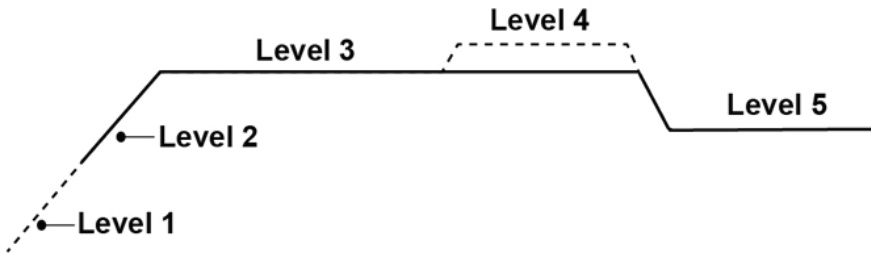
Battery Type Setting Via External Jumper Wire

3 OPERATION

3.1 CHARGING STAGES

The unit has a 5 stage charging algorithm:

1. Level 1 – Soft Charge
2. Level 2 – Bulk Charge
3. Level 3 – Absorption charge
4. Level 4 – Equalizing charge
5. Level 5 – Float mode



Charging Stages, (Y-axis Battery Voltage, X-axis Time)

3.1.1 Soft Charge

When batteries suffer an over-discharge the controller will slowly ramp up the battery voltage to 10V.

3.1.2 Bulk Charge

Maximum current charging until batteries rise to Absorption level

3.1.3 Equalization Charge*

This charging state is only applicable to WET or Calcium battery types. When the battery is deeply drained to below 11.5V, it will automatically run this stage to bring the internal cells to an equal state, reinstating any capacity lost from draining the battery.

3.1.4 Float Charge

Battery is fully charged and maintained at a safe level. A fully charged battery has a voltage of more than 13.6 Volts.

3.2 L.E.D. INDICATORS

State	Fault (Red)	Charge (Blue)	Full (Green)
Solar Power Present-No battery connected	ON	Slow flash	Slow flash
Battery reversed	ON	Fast flash	Fast flash
Solar panel reversed	OFF	OFF	OFF
Soft start charging	OFF	Slow flash	OFF
Bulk, Absorption, Equalization charging	OFF	ON	OFF
Float charging	OFF	OFF	ON
Solar panel weak	Slow flash	OFF	OFF
At night no charge	OFF	OFF	OFF

Slow flash = 1 Hz flash; Fast flash = 3 Hz flash

4 SPECIFICATIONS

1	Electrical Parameters			
1-1	Rated solar panel amps	12	Max.	AMP
1-2	Normal input Solar cell array voltage	15-22		VDC
1-3	Max. solar cell array voltage (output has no load)	25	Max.	VDC
1-4	The controller lowest operating voltage (at solar or battery side)	9V	Min.	VDC
1-5	Standby current consumption at night	2	Max.	mA
1-6	Maximum voltage drop-Solar panel to battery	0.25	Max.	VDC
2	Charging characteristics			
2-1	Minimum battery start charging voltage	3	Min.	VDC
2-2	Soft start charging voltage	3-10	+ / - 0.2	VDC
2-3	Soft start charging current (50% PWM duty)	Up to 6		AMP
2-4	Bulk charge voltage	10 - 14.0	+ / - 0.2	VDC
2-5	Absorption charging voltage at 25°C			
	--Gel type battery	14.1	+ / - 0.2	VDC
	--AGM type battery (default setting)	14.4	+ / - 0.2	VDC
	--WET type battery	14.7	+ / - 0.2	VDC
	--Calcium type battery	14.9	+ / - 0.2	VDC
2-6	Absorption transits to Equalizing or Float condition:			
	--Charging current drops to	1.2	+ / - 0.1	AMP
	-- or Absorption charging timer timed out	4		Hour

2-7	Equalization charging active (--Only for WET or Calcium battery)			
	--Battery voltage discharged to less than	11.5	+ / - 0.2	VDC
	--Automatic equalizing charging periodical	28		Day
2-8	Equalization charging voltage at 25°C	15.5	+ / - 0.2	VDC
2-9	Equalization charging timer timed out	2		Hour
2-10	Float charging voltage at 25°C	13.6	+ / - 0.2	VDC
2-11	Voltage control accuracy	+/- 1%		
2-12	Battery temperature compensation coefficient	-24	mV/°C	
2-13	Temperature compensation range	-20 ~ +50		°C
3	Protection			
3-1	Against reverse polarity or short circuit at panel side			
3-2	Against reverse polarity or short circuit at battery side			
3-3	No reverse current from battery to solar at night			
3-4	TVS or MOV protections against input surge			
3-5	Over temperature protection during charging	65°C		
4	Electrical parts			
4-1	Input output terminal	M4 terminals		
4-2	Temperature sensor port or DIP switch			
5	Physical Parameters			
5-1	Controller material	Plastic, Standard ABS		
5-2	Power terminal maximum stranded wire size	#12AWG stranded-3 mm ²		
5-3	Mounting	Vertical wall mounting		

5-4	IP grade (SRS12-12 / SRS12-12SL)	IP22 / IP67		
5-5	Net weight	Approx. 200g		
6	Environmental characteristics			
6-1	Operating temperature	-25 ~ 50°C		
6-2	Storage temperature	-40 ~ 85°C		
6-3	Operating Humidity range	100% no condensation		



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