REDMAX

SOLAR CHARGE CONTROLLER

RM10ASC

12V PWM
Solar Charge Controller

USER MANUAL

RM10ASC Specifications

Operation

Case Material	ABS
Ingress Protection	IP65
Input Voltage Range	12-22VDC
Maximum Solar Panel Voltage (open circuit)	25V
Maximum Solar Panel Power Rating	170W
Minimum Operating Voltage	8V
Standby Current (i.e. at night)	5mA
Power Terminal Maximum Wire Size	12AWG
Operating Temperature	-25°C to +50°C
Storage Temperature	-40°C to +85°C
Operating Humidity	Up to 100%

Charger

Maximum Current Output	10A
Minimum Battery Voltage	3V
Soft Start Voltage Range	3V to 10V
Soft Start Charge Current (50% duty cycle)	50% of rated charge current
Bulk – maximum current up to:	
LTO	14.0V ±0.2V
Gel	14.1V ±0.2V
$LiFePO_4$	14.4V ±0.2V
AGM	14.4V ±0.2V
Wet	14.7V ±0.2V
Calcium	14.9V ±0.2V
Absorb – constant voltage until current reaches	0.5A ±0.1A (or maximum of 4 hours)
Equalise Voltage (Wet & Calcium only)	15.5V ±0.2V
Equalise Time	Up to 2 Hrs
Float Voltage – LTO & $LiFePO_4$	13.4V ±0.2V
Float Voltage – Gel, AGM, Wet & Calcium	13.6V ±0.2V
Battery Temperature Compensation coefficient	-24mV/°C
Battery Temperature Compensation Range	-20°C to +50°C

Protection

Reverse Polarity, Short Circuit, Over Voltage	Yes
Reverse Current Protection to Solar Panel	Yes
Overtemperature during charging	>65°C

Product Features

- High efficiency PWM (Pulse Width Modulation) controller
- Intelligent multi-stage smart battery charger
- Compatible with Lithium and Lead Acid batteries
- Selectable charge algorithms for:
    - Lithium
        - $LiFePO_4$ (Lithium Iron Phosphate)
        - LTO (Lithium Titanate)
    - Lead Acid
        - Gel
        - AGM (Absorbent Glass Mat)
        - Wet (Conventional Flooded)
        - Calcium
- Can be permanently connected to a battery. Charger will switch to float stage when charging is complete which prevents overcharging and reduces water loss.
- Protects battery from discharge at night. Under low light or no light conditions the controller prevents current flowing backwards from the battery into the solar panel.
- Colored LED's indicate the operational status and battery condition.
- Selectable Digital LCD can display battery voltage, charging current, and total delivered capacity (Amp hours).
- Optional external battery temperature sensor (not included).
- Charger is protected for reverse polarity, short circuit, over temperature and over voltage.
- Controllers can be surface mounted or flush mounted (do not mount directly to metal surface).
- Circuit board and terminals are designed to resist outdoor environments.

Warnings

- Do not disassemble the controller.
- Batteries can be dangerous. Ensure no sparks or flames are present when working near batteries.
- Eye protection should always be used. 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 the panel(s) with a dark cloth or blanket 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 fuse on each circuit including the solar controller
- Do not reverse connect the wires to the solar panel or battery

Mounting the Controller

The Solar Controller has two mounting options:

1. Surface mount

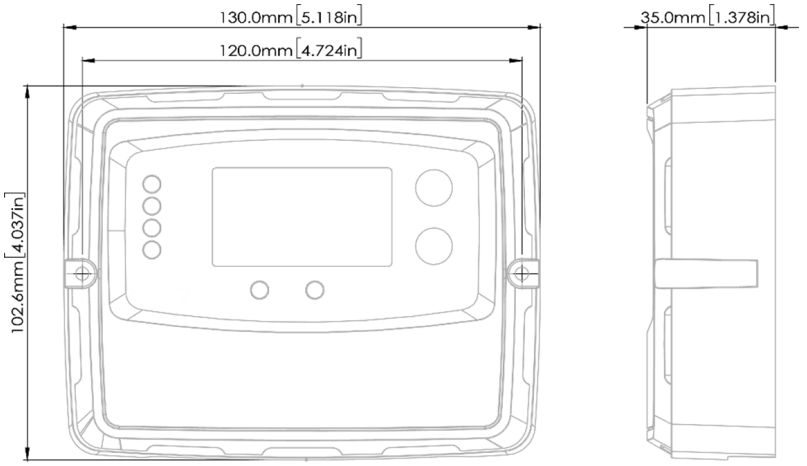
The quickest and easiest way to mount the unit is to use two self-tapping screws to mount the unit to a flat surface.

Warning:
To avoid short circuit to the metal terminals, please do not directly mount the controller onto the metal surface.

2. Recess (panel) mount

Before deciding to use this mounting method, please ensure there is enough depth behind the controller or in the cavity. (Refer to diagram below)

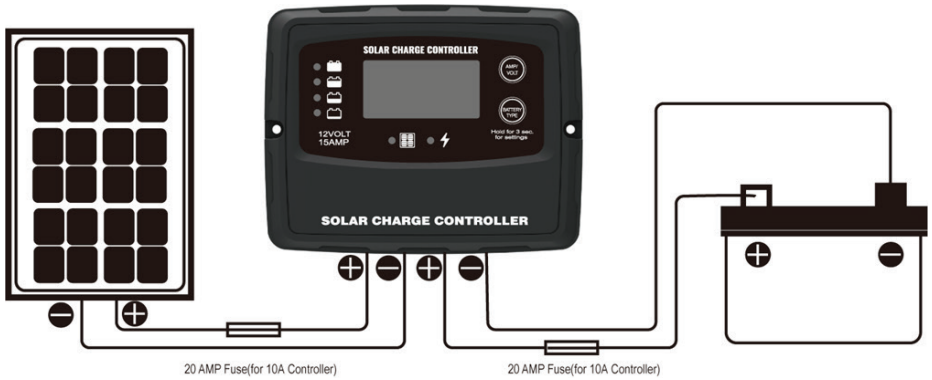
Using the diagram to the right, mark a 103mm x 130mm rectangle where you wish to mount the controller. Cut-out the panel opening then use two self-tapping screws to secure the unit.



Wiring Connections

To protect the battery and the solar panel wiring, it is recommended that you place a 20A inline fuse on the positive wire for both the solar and battery circuits. Each fuse should be located as close as possible to the battery and solar panel.

The solar charge controller has 4 terminals which are clearly marked 'Solar' and 'Battery'. There is a 12V positive and negative terminal for each circuit. Refer to the wiring diagram shown below.



Wire Selection

To minimise any voltage drop, use the table below to choose the correct wire gauge for installation.
Total wire length is the length of one wire measured from solar panel > charge controller > battery.

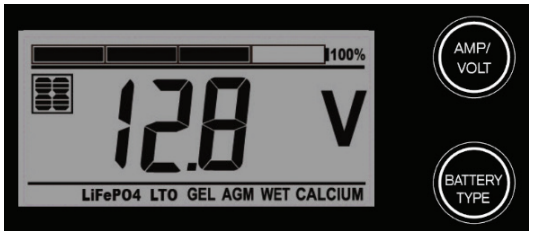
Total Wire Length	**<3m**	**3m – 6m**	**6m – 9m**	**9m – 12m**
Wire Gauge	16AWG	14AWG	12AWG	10AWG

Connection

1. Remove the outer insulation from each wire and connect it to the correct terminal on the back of the solar controller. Positive wires are red and negative wires are black
2. If the wire size is too large to fit the terminal, remove some of the filaments from the end until it can be inserted
3. When the connections are complete and the solar panel is exposed to the sun, the solar charge controller will begin operating automatically

Operation - LCD Display

Please check the battery manufacturer's specifications to select correct battery type. The charge controller has 6 battery types to select from: $LiFePO_4$, LTO, Gel, AGM, Wet and Calcium.



Press and hold the **BATTERY TYPE** button for 3 seconds to change the battery type. When the display begins to flash, release the button. Each press of the **BATTERY TYPE** button will change the battery selection. When you have selected the correct battery type, wait for 5 seconds and the controller will begin charging. The controller will remember this battery selection.

Caution:
Selecting the incorrect battery type setting may damage your battery.

When the controller powers on, it will display a number of check screens before beginning the charging process:

Self-test, digital segments test

Software version

Controller rated voltage and current (e.g. 12.0V, 15.0A)

External battery temperature sensor test (if connected)

Indicates that a solar panel is connected

Operation - LCD Display - continued

After completing the self-check process, the charge controller will begin charging.

Pressing the **AMP/VOLT** button will switch the LCD display between battery voltage, charging current and delivered capacity (Amp-hours). If a temperature sensor is connected, this screen will also be displayed.

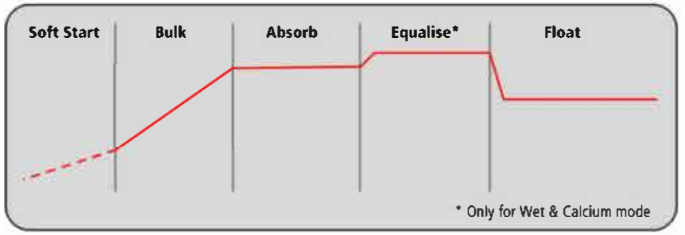
If there is no power being delivered by the solar panel (e.g. night time), pressing the **AMP/VOLT** button will switch the LCD display between battery voltage and temperature (if a temperature sensor is connected)

When the battery has finished charging, the LCD display will cycle between battery voltage and the battery full indicator (FUL).

You also can visually monitor the battery charging status by viewing the LED lights on the left side of the controller. Each LED represents approximately 25% (i.e. 25%, 50%, 75% or 100%).

Charging Stages

The charge controller uses a 5-stage charging algorithm.



Soft Start - When a battery has been over discharged, the controller will slowly increase the battery voltage to 10V

Bulk – Charges at maximum current until the battery voltage reaches the maximum voltage for the selected battery type

Absorb – Constant voltage charging with reducing current until the battery is over 85%

Equalise - Helps restore battery function by equalizing the individual cells, especially helpful if a battery has been over discharged. Only applies with Wet and Calcium battery types

Float - Battery is fully charged. Maintains battery to keep it fully charged

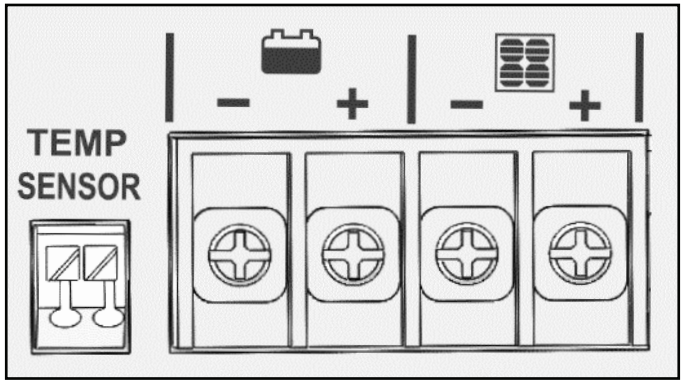
Operation - LED Indicators

The 6 LED's indicate charging status and battery condition

Symbol	⏻	⚡	🔋	🔋	🔋	🔋
LED Colour	Red	Blue	Green	Green	Yellow	Red
Solar power present-no battery connected	ON	OFF	OFF	OFF	OFF	FLASH
Soft charging	ON	FLASH	OFF	OFF	OFF	ON
Bulk charging	ON	ON	OFF	Subject to battery voltage		
Absorption charging	ON	ON	OFF	ON	OFF	OFF
Equalization charging	ON	ON	OFF	ON	OFF	OFF
Float charging	ON	OFF	ON	OFF	OFF	OFF
Solar panel weak	FLASH	OFF	OFF	Subject to battery voltage		
At night no charge	OFF	OFF	OFF	Subject to battery voltage		
Battery Voltage below 11.5V	ON	ON	OFF	OFF	OFF	ON
Battery Voltage between 11.5V-12.5V	ON	ON	OFF	OFF	ON	OFF
Battery Voltage above 12.5V	ON	ON	OFF	ON	OFF	OFF

Optional Temperature Sensor

The controller includes the ability to connect a battery temperature sensor (not included)



If a battery temperature sensor is connected, the charge controller will automatically adjust the battery charging voltage based on the measured battery temperature.

The charge controller will also provide over temperature protection for the battery. If the battery exceeds the maximum allowable temperature, the charge controller will stop charging the battery.

Errors and Faults

Solar Panel Errors	LCD display	LED indication	LCD backlight
Solar panel weak		⏻ FLASH	ON
Solar panel reverse connection	E01	⏻ FLASH	FLASH
Solar panel over voltage (> 26.5V)	E02	⏻ FLASH	FLASH

Battery Errors	LCD display	LED indication	LCD backlight
Battery disconnected or less than 3.0V	b01	🔋 FLASH	FLASH
Battery reverse connection	b02	🔋 FLASH	FLASH
Battery over voltage than > 17.5V	b03	🔋 FLASH 🔋 FLASH 🔋 FLASH	FLASH
Battery temperature over 65C	b09	🔋 FLASH 🔋 FLASH 🔋 FLASH	FLASH

Solar Controller Errors	LCD display	LED indication	LCD backlight
Controller Over Temperature Protection	otP		FLASH

REDMAX Accessories are a product of R&J Batteries.
For more information on the range or for product assistance please contact:
www.rjbatt.com.au 1300 769 282

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