

REDMAX

RMBC1220

12V 20A

Smart Battery Charger



User Manual

Congratulations on purchasing the REDMAX RMBC1220 smart battery charger. This charger is designed to intelligently charge 12V lead acid and lithium iron phosphate (LFP or LiFePO_4) batteries with a selectable current range from 1A to 20A. This charger also features a Power Supply mode. Please take the time to carefully read and understand this manual before using this product. Ensure that you store this manual in a safe place for future reference. A copy of this User Manual can also be downloaded from www.rjbatt.com.au

Included in the box

- Battery Charger
- User Manual
- Battery Clip Adapter Cable
- Ring Terminal Adapter Cable

IMPORTANT SAFETY ADVICE & WARNINGS

- This charger is designed to charge 12V lead acid and LFP batteries. Do not use this charger to charge any other type of battery.
- Always ensure that the charger is set to the correct battery type before connecting it to a battery.
- Always refer to the battery manufacturer's specifications and recommendations if you're unsure of the battery charging requirements.
- For lead acid batteries, explosive gases can be produced during the charging process so you must ensure the battery is charged in a well ventilated area.
- NEVER smoke, use an open flame or create sparks near a battery during charging as this may cause an explosion.
- If battery acid contacts your skin or clothing, wash immediately with soap and water. If acid enters your eye, immediately flush the eye with running cold water for at least 10 minutes and seek medical attention.
- Do not attempt to use the charger if it has been dropped or has any physical damage.
- Do not attempt to use the charger if the cables or connectors are damaged.
- Never attempt to charge a damaged, frozen, or non-rechargeable battery.
- Never place the charger on the battery or the battery on the charger.
- When working with batteries, remove personal metal items such as rings, bracelets, necklaces and watches, and make sure you don't short circuit the battery terminals with any type of metal tool or jewellery as this can cause personal injury or an explosion.
- Do not disassemble the charger. Take it to a qualified and authorised person for repair.

- If using a generator, you must use a surge protector to protect the charger from voltage spikes.
- This charger is a fanless design, which means that the charger case may become hot (approx. 55°C) at high charging rates. Always ensure that there is a minimum of 50mm clear margin from any other items or surfaces to allow adequate air flow around the charger when operating.
- Do not handle the charger when it is in use.
- Do not stack items on top or around the charger when in use.
- While the charger is IP65 rated, it is not designed for constant unprotected outdoor use.
- The charger is not a toy. Keep it away from children and pets. Children should be supervised to ensure that they do not play with the appliance.
- After charging is complete, disconnect the battery charger from the mains power supply.

FEATURES

High Efficiency Switchmode Technology

Employs the latest switchmode circuit design for high efficiency charging.

Microprocessor Controlled 7 Stage Charging

Charging stages include BMS Wake Up (LFP), Initialise, Soft Start, Bulk, Absorb, Analysis, Recondition (GEL, WET & AGM), Equalise (CAL) & Float.

Selectable Current

Charging current can be adjusted to 1A, 3A, 7A, 12A or 20A to suit the battery being charged.

Recommended Charge Rates (12V Battery)

Charge Current	1A	3A	7A	12A	20A
Lead Acid Battery Capacity	4-20Ah	12-60Ah	28-140Ah	48-240Ah	80-400Ah
Lithium Battery Capacity	2-10Ah	6-30Ah	14-70Ah	24-120Ah	40-200Ah

Automatic Multistage Charging

The charging process is managed by the microprocessor for each battery type. The charger will use up to 7 stages to safely & reliably charge the battery.

Charge Profiles for Lead Acid and Lithium (LFP) batteries

Selectable battery types are for Gel (GEL), AGM (AGM), Flooded (WET), Calcium/EFB (CAL) and Lithium Iron Phosphate (LiFePO₄ / LFP).

BMS Wake Up and 2 Stage Absorb for Lithium (LFP) charging

The LFP charging mode includes an initial wake up signal for lithium batteries where the BMS has triggered a low voltage cutoff. It also employs a 2 step Absorb algorithm to ensure lithium batteries achieve 100% State of Charge.

Power Supply Mode

When Power Supply (PWR) mode is selected, the charger will supply a constant 14.0V. This can be used to help stabilise a vehicle's battery voltage during testing or diagnostics. It can also be used to directly power a 12V device. Note that output current is limited to the current level selected on the front panel of the charger.

Reverse Polarity and Over Voltage Protection

The charger has inbuilt protection which will prevent it from charging if the charger leads are connected in reverse, or if the battery voltage is too high. The Fault LED will also indicate the error (see table on page 10).

Over Temperature Protection

If the internal temperature of the charger becomes too high, the charger will stop charging to protect itself from damage.

Fanless design

The REDMAX RMBC1220 has been designed for durability and longevity. Many chargers use a fan to cool the internal components however if the fan fails, the charger will overheat and may be damaged. The REDMAX RMBC1220 uses an innovative approach which does not require a fan for cooling. Instead, it uses the outer aluminium case to remove heat from the internal components. As a result, the case can become hot when operating at high current settings. There is a warning message on the top of the charger case to remind the user of this. While the case may feel hot, the temperature will generally not exceed 55°C during normal operation (dependent on ambient temperature).

IP65 Case

An advantage of the fanless design is that it allows the charger case to seal well enough to allow it to operate in environments where there is dust or moisture, for example a workshop or a garden shed. While the charger is IP65 rated, it is not designed for constant unprotected outdoor use.

SPECIFICATIONS

Rated Input Voltage	220-240VAC, 50Hz
Rated Input Current	2.2A
Operating Environment Temperature	-10°C to 40°C, 0-90% RH
Output Current	Selectable 1A, 3A, 7A, 12A & 20A
Minimum Start Voltage	5V
Back Drain	<0.5mA
BMS Wake up for LFP (LiFePO₄)	
Output Voltage	13.8V
Time	30 seconds
Absorb Voltage	
Gel	14.1V
AGM	14.4V
Flooded	14.6V
Calcium/EFB	14.6V
LFP	14.2V
Recondition/Equalise Voltage	
Gel	14.4V
AGM	14.7V
Flooded	15.0V
Calcium/EFB	16.1V
Float Voltage	
Gel	13.6V
AGM	13.6V
Flooded	13.6V
Calcium/EFB	13.6V
Power Supply Mode	
Output Voltage	14.0V
Output Current	1A, 3A, 7A, 12A or 20A (selectable)

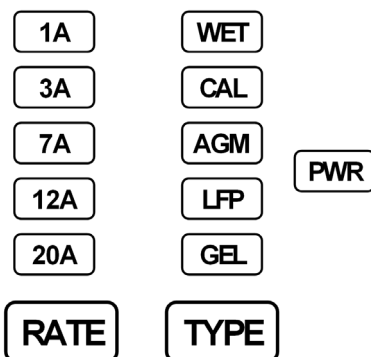
OPERATING INSTRUCTIONS

Charge a Battery

Before connecting a battery to the charger:

1. Confirm that it is a 12V battery
2. Identify the type of battery to be charged
3. Note the battery capacity (measured in Ah)

4. Use the **RATE** and **TYPE** buttons on the front of the charger to select the charging status.



Battery Type

Press the **TYPE** button to select the correct battery type:

- Select **WET** for Standard Flooded batteries
- Select **CAL** for Calcium & EFB batteries
- Select **AGM** for AGM batteries (sometimes labelled as VRLA)
- Select **LFP** for Lithium Iron Phosphate (LiFePO₄) batteries only
- Select **GEL** for Gel batteries
- Select **PWR** for Power Supply Mode

Charging Rate (Current)

Press the **RATE** button to cycle through the different charging current settings and select the desired current. Use the table below to identify the recommended charge rate. Charging at higher rates than recommended may damage the battery.

Recommended Charge Rates

Charge Current	1A	3A	7A	12A	20A
Lead Acid Battery Capacity	4-20Ah	12-60Ah	28-140Ah	48-240Ah	80-400Ah
Lithium Battery Capacity	2-10Ah	6-30Ah	14-70Ah	24-120Ah	40-200Ah

Connecting the Charger to the Battery

The output cable of the RMBC1220 has an XT60 style connector attached to the end of it. Included in the box with the charger are two different charging adapters which are both fitted with a compatible XT60 connector.

One adapter has battery clips which allow you to connect directly to the terminals of a battery. The other adapter has ring terminals and is designed to be permanently connected to a battery where terminals may be difficult to access.

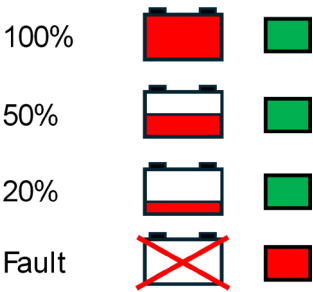
Once the correct battery **TYPE** and charge **RATE** has been selected, connect to the battery using the either the charging clips or the ring terminal adapter. Ensure that the black clip is connected to the negative terminal and the red clip is connected to the positive terminal.

The charger will begin charging within 1-2 seconds, after it has detected the battery.

Charge Status LED Indicators

Once charging has commenced, the LED charge status indicators will illuminate or flash to indicate the current charging status.

The red LED will illuminate or flash if there is a fault with the charger.



The following table details the charging status, and also the faults indicated by the Charge Status LED's:

	20%	50%	100%	PWR	Fault
Charging Status					
Initialise / Soft Start	Flash				
Bulk	On	Flash			
Absorb	On	On			
Analysis / Recondition / Equalise	On	On	Flash		
Fully Charged	On	On	On		
Power Supply Mode				On	
LED Fault Indicators					
Output Clips Shorted					On
Output Reverse Polarity					Flash
Initialise Stage Timeout	On				Flash
Soft Start Stage Timeout	Flash				Flash
Bulk Stage Timeout		Flash			Flash
Absorb Stage Timeout			Flash		Flash
Battery Voltage LOW – Analysis Stage	Flash	Flash	Flash		Flash
Battery Voltage Over 17.0V			On		Flash
Overload – Power Supply Mode				Flash	Flash

Charging Stages - GEL, WET, AGM & CAL

Initialise & Soft Start: These two preliminary stages are used to begin charging a severely discharged battery.

Bulk: This stage is also known as constant current charging. The charger will operate at maximum power (based on the charge **RATE** selected) until the Absorb voltage is achieved for the selected battery **TYPE**.

Absorb: This stage is also known as constant voltage charging. It is activated when the Absorb voltage is achieved for the selected battery **TYPE**. The charger will reduce the charge current during this stage to ensure the correct Absorb voltage is maintained.

Analysis: The charger will stop charging and monitor the battery voltage to assess if the battery requires a reconditioning or equalise stage, or if it should proceed to the Float stage.

Recondition (GEL, WET & AGM): This stage is used when a battery does not maintain the expected voltage after the Absorb stage is complete. This stage has a run time of 4 hours and can help recover and activate batteries which have been severely discharged.

Equalise (CAL): Calcium and EFB batteries can suffer from stratification. When this occurs, the sulphuric acid and water partially separate, which reduces the operating efficiency of the battery. The Equalise stage is designed to reverse stratification and restore performance to an otherwise healthy battery. While it is very effective at this, it cannot restore or repair a battery which is at the end of its service life.

Float: Once a lead acid battery has finished charging, the Float stage is activated to maintain the battery at 100% SoC without overcharging the battery. This means that the battery can be left connected to the charger for extended periods of time.

Charging Stages - LFP

BMS Wake Up: When the LFP battery type is selected, the charger will initially output 13.8V for 30 seconds. This will wake up and reactivate a lithium battery where the BMS has activated low voltage protection.

Bulk: This stage is also known as constant current charging. The charger will operate at maximum power (based on the charge **RATE** selected) until the Absorb voltage point is achieved for the selected battery **TYPE**.

Absorb: For LFP batteries, the charger utilises a 2 step Absorb stage to charge the battery more efficiently. The charger will reduce the charge current during this stage to ensure the correct battery voltage is maintained. When complete, the charger will stop as there is no Float stage for LFP batteries.

Power Supply Mode

When set to Power Supply (**PWR**) mode, the charger will output a constant 14.0V DC at the current (**RATE**) indicated on the front panel of the charger. This can be useful to help stabilise the voltage of a vehicle during diagnostics. It can also be used to directly power a 12V DC device.

Note: Do not use Power Supply mode to charge a battery.

FREQUENTLY ASKED QUESTIONS

How do I know when the battery is charged?

When charging is completed, the 20%, 50%, and 100% LED are constantly illuminated.

Can I use the charger to power 12V devices?

Yes, the charger can be used to power 12V devices by selecting Power Supply (PWR) mode. You must ensure that the 12V device does not require more current than the charger is set to deliver.

What happens if I have a device connected to the battery while it is charging?

If a device or load is connected to the battery as well as the charger, the charger should be set to Power Supply (**PWR**) mode. Selecting any other battery **TYPE** will cause the charger to error or time out, as the battery voltage will not behave as expected during the charging process.

Why does the charger not start charging when I connect it to the battery?

The battery voltage may be below the minimum voltage required for charging. If the battery is known to be a good battery you can use the following procedure; if you are unsure, take the battery to a professional and have it tested. To increase the voltage in a healthy battery, connect the red clip to the positive terminal and the black clip to the negative terminal. Select Power Supply (**PWR**) mode with a charge rate of 1A. Use a multimeter to check and monitor the voltage to confirm it increases. When the battery voltage is above 6V, disconnect the charger and change the battery **TYPE** to match the type of battery being charged.

If you are charging a lithium iron phosphate battery which has its low voltage protection activated, you must ensure that the charger is connected to the battery within 30 seconds of the LFP battery **TYPE** being selected. This ensures that the BMS wake up function is active and will 'wake up' the discharged battery.

Can you charge a battery while it is installed in a vehicle?

Yes, you can charge a battery while it is installed in a vehicle. In some vehicles it can be difficult to access the battery directly. When this is the case, the charger can be connected to the jump start points of the vehicle.

How long can I leave a battery connected to the charger?

For lead acid batteries, when the charger has finished charging a battery it will enter **FLOAT** mode. This mode is designed to maintain the battery at a high State of Charge for an extended period of time. For deep cycle lead acid batteries, it is recommended that they be partially discharged and then recharged every 2-3 months to help maintain their health and function.



*For more information on REDMAX products, visit your
nearest R&J Batteries branch or distributor*

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