Mroinge

MBC050L

6V/12V 2A/5A DC

Suitable for 6V/12V Normal Lead Acid, Sealed, Leisure, AGM, Gel-Batteries and 12V Lithium(LiFePO4) between 7-160Ah, with LCD display



IP65

INTRODUCTION

The Mroinge MBC050L is a member of the family of advanced battery chargers manufactured by Mroinge International Ltd. Mroinge chargers will increase your battery's performance and prolong its life.

We have taken numerous measures in quality control to ensure that your product arrives in top condition and will perform to your satisfaction.

Please carefully read and follow the safety and operating instructions. Not following these instructions may result in a serious accident, including damaged property or serious injuries.

IMPORTANT SAFETY INSTRUCTIONS

If you are not confident working with 12V DC voltage or are unsure of what you are doing, consider to seek for professional help e.g. a car garage or your vehicle´s manufacturer.

Read your vehicle's owner's manual!
Some vehicle manufacturers may have special requirements before charging the vehicle´s battery. (e.g. fuses that have to be removed or certain security demands).

You MUST NOT connect to 24V or other unsuitable batteries (e.g. NiCd-batteries). The battery charger is not designed as a power supply. Not following these instructions could cause serious personal injury or material damage.

This unit has safeguards against reverse-polarity and short-circuit. Although it is highly recommended not to touch or connect the red to the black clamps or to connect the leads in reverse polarity. This could cause dangerous sparks and electric arcing. Only connect and disconnect the battery leads when the mains supply is disconnected.

Use the charger in dry environment only. Do not use the unit close to open fire. Do not operate the unit in explosive atmospheres, such as in the presence of flammable liquids, gases or dust. Please stop using the device, if the unit is getting very hot, is smoking or is showing any abnormal behaviour. Mroinge is not liable for any direct or indirect damages or injuries caused by the use of the device, especially caused by failure to follow these instructions.

TYPE OF BATTERIES
This charger is intended to be used 6V/12V Normal Lead Acid, VRLA, Sealed (MF Maintenance-Free), Leisure, AGM, GEL-Batteries and 12V Lithium(LiFePO4) between 7-160Ah. **Do not** try to charge unsupported types of batteries like NiCd.
（ATTENTION: This unit is only suitable for one type of lithium battery, It is 12V Lithium(LiFePO4) only, Other types of lithium battery does not support.）

GASES
When the battery is being charged, you may notice bubbling in the fluid caused by the release of gas. As the gas is flammable, avoid naked flames, glowing or electrostatically charged material and sparks in the vincity of the battery. Provide adequate ventilation. Because of this risk of explosive gas, only connect and disconnect the battery leads when the mains supply is disconnected.

STORAGE
When not in use, store the battery charger in a dry environment.

MAINTENANCE
Don't try to open the body casing. There are no user-serviceable parts inside. Damage due to improper use, modifications or attempted repairs lead to the exclusion of liability and the loss of warranty. The mains supply cord of this device cannot be replaced; if the cord is damaged, the appliance should be discarded.

PRECAUTIONS WHEN WORKING WITH BATTERIES
- Avoid getting electrolyte on your skin or clothes. It is acidic and can cause burns. If battery acid contacts skin or clothing, wash immediately with soap and water. Baking soda neutralizes lead acid battery electrolyte. If electrolyte gets into your eyes, immediately flood your eyes with running cold water for at least 20 minutes and get medical attention immediately. Eye protection is therefore recommended.
- Never charge a frozen battery. If battery fluid (electrolyte) becomes frozen, bring the battery to a warm area to allow the battery to thaw before you begin charging.
- Do not touch the battery clamps together when the charger is on.
- Never use the charger when it has received a hard blow, been dropped, or otherwise been damaged. Take it to a qualified professional for inspection and repair.
- Prevent the power cord from being stepped on, tripped over, or being damaged.
- Never pull out the plug by the cord when unplugging the charger. Pulling on the cord may cause damage to the cord or the plug.
- Although it is usually possible without causing problems to charge the battery when installed, we recommend to remove the battery from the car before charging. When charging the battery while installed in the car, Mroinge cannot take any responsibility for harm to your car electronic or the car itself.
- Never smoke or allow a spark or flame in vicinity of battery or engine.
- Always keep metal objects or other materials that can short circuit battery terminals securely away from the batteries. The resulting spark or short-circuit may cause an explosion and can produce a current high enough to weld a ring or the like to metal. Remove personal metal items such as rings, bracelets, necklaces, and watches when working with starter batteries.

PARTS

- **MBC050L main unit**
- **1 set of crocodile clamps**
- **1 set of ring terminals (for a permanent installation)**

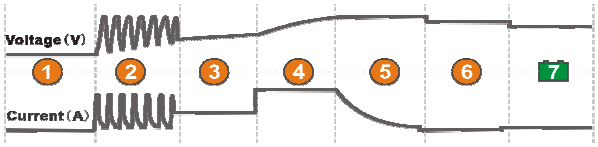




FEATURES

Automatic and Intelligent 7-Stage Charging Curve
The MBC050L is controlled by a 10-bit ADC microprocessor with 7-stage charging characteristic for charging batteries automobiles, motorcycles, snow mobiles, tractors, personal watercraft, boats etc.
A microprocessor senses the condition of the battery and controls the regulator to provide the right current and voltage to the battery (charging characteristic). This will give the best effect on charging and give the longest life to battery.

Charging characteristic:



- **[1] BATTERY TEST:** After connecting to the power supply, press Mode button to select appropriate battery charging mode. After connecting to battery, the charger will automatically detect the battery performance. In normal status, the battery will enter stage 2 in 4 seconds. 12V lead-acid batteries lower than 3.5V or 12V lithium batteries lower than 4V are invalid and beyond handling.
- **[2] DESULPHATION:** Detects sulfated batteries. Pulsing current and voltage, removes sulfate from the lead plates of the battery restoring the battery capacity.
- **[3] SOFT START:** Initial battery test to determine battery condition. If the battery is severely discharged, the charger will begin the Soft Start stage. Charging starts with reduced current until the battery voltage reaches a normal charge.
- **[4] BULK:** Major charging stage where the battery receives the majority of its charge. During this stage the battery is brought up to 75-80% of its charge. The battery charger delivers maximum current until the terminal voltage has risen to full charge level for normal battery.
- **[5] ABSORPTION:** Completes the charge up to virtually 100% at a constant voltage. The current tapers off when the current reaches the minimum level.
- **[6] ANALYSIS:** Tests if the battery can hold charge. Batteries that can not hold charge may need to be replaced(Fault LED is solid red).
- **[7] FLOAT:** Low constant voltage, minimal charge current, battery is fully charged, and maintenance your battery.

Operating characteristics :

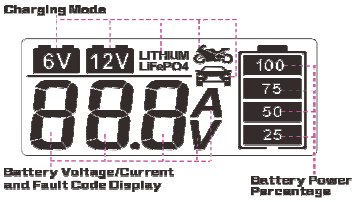
Modes	6V Lead-Acid	12V Lead-Acid	12V Lithium (LiFePO4)
[1] BATTERY TEST	whether voltage exceeds charging voltage (3.5V)	whether voltage exceeds charging voltage (3.5V)	whether voltage exceeds charging voltage (4.0V)
[2] DESULPHATION	2A until the voltage drops less than 2V	2A until the voltage drops less than 2V	NO
[3] SOFT START	1.0Adc, until the voltage reaches 5.0V	1.0Adc, until the voltage reaches 10V	0.25Adc, until the voltage reaches 8.5V
[4] BULK	2Adc, until the voltage reaches 7.1V	2A/5Adc, until the voltage reaches 14.1V	5Adc, until the voltage reaches 14.2V

[5] ABSORPTION	Current reduces until voltage reaches 7.2V	Current reduces until voltage reaches 14.3V	Current reduces until voltage reaches 14.4V
[6] ANALYSIS	Checks if voltage drops less than 2V	Checks if voltage drops less than 2V	NO
[7] FLOAT	6.6V, Float charge for fulled	13.2V, Float charge for fulled	13.6V, Float charge for fulled

Note: This MBC050L battery charger had the lithium(LiFePO4) battery activation function, when the lithium(LiFePO4) battery is protected(0V output).

CABLE CONNECTOR
The MBC050L offers two options for connecting the battery. Via the cable connector you can select which connection you want to use:
- Crocodile clamps for easy and flexible use.
- Ring Terminals for permanent installation on your battery.

LCD Reference:

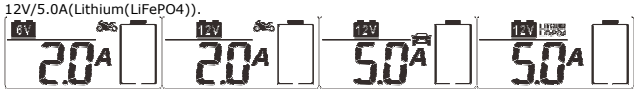


Fault/Charging/Full LED Indication



- **Fault LED –** Flashing Red – DC clamps are connected in reverse polarity or short-circuit.
- **Fault LED** – Solid Red – Battery fault (Refer to page 6 Fault Code).
- **Charging LED –** Flashing Green – The charger is charging to the battery.
- **Full LED –** Solid Green – The battery is fully charged and in maintenance mode.

CHARGING MODE
The unit has 4 kinds of charging mode: 6V/2A(SLOW), 12V/2A(SLOW), 12V/5.0A(FAST), 12V/5.0A(Lithium(LiFePO4)).



REVERSE-POLARITY PROTECTION
This unit offers reverse-polarity protection, the "Fault" LED will flashing red and the charging process will not start. If this happens, unplug immediately from mains,
connect the red crocodile clip to positive (+) battery post, and black crocodile clip to negative (-) post, then plug into the mains power and the charging process will start.

SHORT-CIRCUIT PROTECTION
Should you accidentally touch the crocodile clips together whilst the mains power is on, the unit will not perform charging. Unplug from mains, disconnect and start the process again being careful not to touch the clips together.

Charger Mode memory
In the event of a black-out or loss of AC power, the charger will automatically memorize the charging mode. When AC power is restored, the charger will automatically restart charging.

Other features
Anti Spark Protection, Charger Overheating Protection, Waterproof PC Housing, Ingress Protection Rating IP65.

Battery Fault – When charging, if a charge failure occurs, the "FAULT" LED will indicator solid/flashing red and LCD will display the following **Fault Code**:

Fault Code	Fault Event	LED/Buzzer	What to do
Hi	High battery voltage > 15 V (12V Mode) > 7.2 V (6V Mode)	Solid Red LED and Buzzer sounds for 10 seconds	Choose the correct charging mode, or replace the battery
E01	Reverse polarity protection or short-circuit protection	Flashing Red LED and Buzzer sounds for 10 seconds	Check the DC clamps whether connected in reverse polarity or short-circuit.
E02	Battery voltage is low, or it is bad battery	Solid Red LED and Buzzer sounds for 10 seconds	Change from 6V mode to 12V charging mode, or replace the battery
E03	Serious battery aging	Solid Red LED and Buzzer sounds for 10 seconds	Recharge it again, or replace the battery

OPERATION

PLEASE READ CAREFULLY BEFORE USING THE DEVICE
Suitable for 6V/12V Normal Lead Acid, VRLA, Sealed (MF), Leisure, AGM, Gel Batteries and 12V Lithium(LiFePO4) between 7-160Ah.
（ATTENTION: This unit is only suitable for one type of lithium battery, It is 12V Lithium(LiFePO4) only, Other types of lithium battery does not support.）

1. PREPARING THE BATTERY
It is recommended to disconnect the battery from the car if possible. This will avoid possible damage to the alternator and your car´s electronic system. To avoid damage to the bodywork from possible spillage, it is also recommended to remove the battery completely from the vehicle. It is advisable to use personal protective clothing (safety goggles and gloves are highly recommended) when handling the battery, as there is a high possibility of corrosive acid being on the outside of the battery.
For permanently sealed battery, it is not necessary to carry out the following checks. Don´t try to open a sealed or maintenance-free battery.

Firstly remove the caps from each cell and check that the level of the liquid is sufficient in each cell. If it is below the recommended level, top up with de-ionized or distilled water.

ATTENTION: Under no circumstances should tap water be used. The cell caps should not be replaced until charging is complete. This allows any gases formed during charging to escape. It is inevitable that some minor escape of acid will occur during charging.
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2. Step for connect charging cable
Step 1 – Mains AC power on;
Step 2 – Select correct charging mode;
Step 3 – Connect the clamps or ring terminals to the battery in the following order:
- Connect the positive charging lead (RED) to the positive terminal post of the battery (marked +).
- Connect the negative charging lead (BLACK) to the negative post of the battery (marked -).

It is important to ensure that all connections are making good contact with their respective terminal posts. Now the unit will automatically start charging.

3. CHARGING
During the charging process the "**25%-75%**" LCD icon will flashing gradually, and the "**CHARGING**" LED green will also flashing at the same time.

Desulfating – When LCD displays the "**dES**" icon, the battery in desulfating, it is normal charging. You just wait quietly, the charger will automatically detect the battery to calculate the desulfation time(max 4h), when the desulfation is completed, the charger will automatically enter the next stage of charging.

Fully Charged – When "**FULL**" LED solid green and the LCD displays the "**FUL**" and "**100%**" icon, the battery is completely charged. The battery charger now switches to the FLOAT mode and doesn't require your attention until the next time it is used, the MBC050L battery charger will automatically maintain your battery.

4. AFTER CHARGING
Please note: For reasons of safety, always connect and disconnect crocodile clamps from the battery with the mains plug disconnected.
Unplug charger from the mains supply and disconnect the clamps from the battery posts. If the charged battery is maintainable, inspect the liquid in each cell again and top up carefully if necessary. Now replace the caps. Any surplus fluid around the cell tops should be wiped off with extreme care as it may be acidic.

BATTERY MAINTENANCE AND CARE

It is essential to keep your battery regularly charged throughout the year, especially during the winter months. Low temperature reduces the effectiveness of your car battery and your motor oil is thicker. Engines are more difficult to start and the heater, windscreen wipers and lights are all draining power. It is at this time that batteries have to be at peak power. If your battery is not regularly maintained and kept fully charged, it can cause problems and a possible breakdown.

Listed are some helpful hints on how to keep your battery healthy in conjunction with your Mroinge battery charger:

Detecting faulty Cells with a hygrometer
(not possible with sealed or maintenance-free batteries)
Starter-Batteries are usually made of several cells, with a nominal voltage of 2V per cell. If one of the cells is defective, the whole battery deteriorates. If, after several hours of charging, your battery is still flat, you should test the battery cells.
Using a hydrometer, which can be purchased from most motor accessory stores, you can check the specific gravity of the electrolyte in each cell. Take hydrometer readings from each cell in the battery. Put the fluid back into the cell after testing, taking care not to spill the fluid. If one reading is lower than the others, this could indicate a faulty cell. If necessary, get an auto-electrician to check your battery. In some cases a battery can be revived, but one faulty cell is enough to ruin your battery.

Care
Sometimes the battery may appear flat, but the reason could simply be dirty or loose connections on your battery terminals. It is important to maintain the leads on a regular basis. Clean all contacts and grease them using terminal grease. Make sure that all connections are tight.
It is essential to keep the electrolyte level above the plates, note that you should not overfill it, as the electrolyte is strongly acidic. When topping up, do not use tap water. Always use distilled or de-ionized water. It is important to keep the acid level up. If necessary have it checked by your garage.

TECHNICAL SPECIFICATIONS

MBC050L main unit	
Suitable Batteries	Normal Lead Acid, VRLA, Sealed (MF), Leisure, AGM, GEL Batteries and 12V Lithium(LiFePO4) between 7-160Ah capacity
Suitable Battery Voltages	6V, 12V
Charging Current	2A, 5A DC
Electrical Safeguards	Protection against: overheat, short-circuit, reverse polarity, sparks.
Maximum conversion efficiency	≥85%
AC Input	AC 100V – 120V ~ 50/60Hz; Max. 90W
DC Output	6V/Slow Lead Acid: Max. 7.2V, 2A DC
	12V/Slow Lead Acid: Max. 14.3V, 2A DC
	12V/Fast Lead Acid: Max. 14.3V, 5A DC
	12V Lithium(LiFePO4): Max. 14.4V, 5A DC

This model may be operated in USA countries.

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ENVIRONMENTAL PROTECTION

The product is classed as Electrical or Electronic Equipment and should not be disposed of with other household or commercial waste at the end of its working life. Please recycle where facilities exist. Ask your local authority or retailer for recycling advice.

WARRANTY

Mroinge warrants this product for a period of 2 years from the date of purchase to the original purchaser. Warranty is not transferable. Warranty covers defect against workmanship and materials only. To obtain warranty service, please return the unit to the place of purchase or your authorized Mroinge dealer together with your proof of purchase. The warranty is void, if the product has been damaged or not used as described in this manual. Warranty is void, if a non-authorized repair has been performed. Mroinge makes no other warranty expressed or implied. Mroinge is only responsible for repair or replacement (at Pro-Users' Discretion) of the defective product and is not responsible for any consequential damage or inconvenience caused by the defect.