

MARXON®

OPERATION & MAINTENANCE MANUAL

Automobile start, start-stop maintenance-free battery
(Flooded / EFB / AGM series)

Read this manual carefully before installing and
using batteries

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1. Safety and Warning



When storing, transporting, installing, using, maintaining and recycling the battery, please according to the instruction contents to operate, and abide by the precautions.



Stay away from any fire and hot source.



Please wear protective clothes, glasses and rubber gloves when handle the battery. Please be careful to follow the prevention accident protocol.



Please wash with plenty of water and go to hospital if acid splash into eyes. Please wash with water if acid splash on skin or clothes.



Warning! The metal part of the battery is electrically charged, do not place conductors such as metal tools on the battery to avoid short circuit. Keep the pole connector firmly to prevent explosion caused by sparks.



Warning! When the battery is charged, hydrogen and Oxygen will be produced. Always check the battery exhaust vent to keep it unobstructed, and prevent the battery from exploding due to blockage.

Warning! The usage and storage environment of the battery should be well ventilated to prevent the accumulation of hydrogen and oxygen, and the battery must not be used in an enclosed environment.

Warning! After battery charged or the vehicle runs continuously, it should be left for 30 minutes to ensure that the hydrogen and oxygen generated in the battery are completely dissipated before the battery can be disassembled, installed or other operation.



The sulfuric electrolyte of the battery is corrosive, and it is impossible to touch the electrolyte under normal use condition, but if the battery is damaged or the electrolyte spilled by misoperation, please do not touch it.



Keep and use the battery out of reach of children.



The battery should be stored and used upright, not inverted and side lying, transportation or handling should avoid tilt more than 40 degrees, the battery should not be under heavy pressure and collision, to prevent the sulfuric acid electrolyte from the exhaust hole overflow.



The battery is very heavy, please handle it gently and use suitable handling tools.



Please use and maintain the battery correctly in strict accordance with the related warning contents marked on the battery.



The battery is marked with recovery and recycling signs, and is prohibited to be discards at will. The battery and the leakage will pollute the environment, and should be recycled by regular organization.



Safety Precaution:

-
- (1) Please do not use the battery outside the specified purpose, otherwise, the battery may leak, heat, fire or explode.
 - (2) Forbid disassemble, remold, destroy, strongly impact or throw the battery. Otherwise, the battery may leak, heat, fire or explode.
 - (3) Forbid putting the battery into the fire or heating, otherwise make the battery fire or explode.
 - (4) Forbid short circuit connect the battery, otherwise make the battery heat, fire or explode.
 - (5) Forbid using gasoline, alcohol and other organic solvents to wipe the battery shell, otherwise make the shell stress cracking.
 - (6) When the battery is used, please contact the supplier for technical guidance if the contents not described in this manual or not consistent with other product information.

2. Storage and Handling

- (1) Automobile starting, start-stop maintenance free battery (Abbreviation battery) is charged with liquid battery, should be stored 41°F ~ 104°F dry, clean, ventilated environment, and avoid children close and firework, should avoid the direct sunlight and other heat source of radiation, baking and rain.
- (2) Handling the battery should be lightly, do not throw, lean, overturn, heavy pressure, to prevent the battery under the heavy pressure and collision caused by the shell damage and electrolyte leakage.
- (3) The battery should be placed upright, not exceed the limit of 6 layers or the number of limit of stacking layers indicated on the outer package.
- (4) If the battery has a handle, please carefully check the handle if is firm when handing. Do not shake repeatedly when handing, so as not to cause the battery to fall out of the handle.

- (5) The battery is stored at a room temperature exceed more than 3 months, or the terminal voltage lower than 12.5V (lower than 12.4V for high temperature, lower than 12.7V for AGM), the battery should be recharged in time, see 4.1~4.2 for the method of recharged the battery.
- (6) The inventory management of the battery should be marked, adhere to the principle of the first-in, first-out and reasonable inventory, in order to prevent failure due to too long storage time, resulting in unnecessary losses.

3. Installation and Usage

3.1 Checking the Battery Before Using

- (1) Before the battery is used, the battery surface should be checked for crack, damage, electrolyte leakage or other abnormal phenomena.
- (2) Use a multimeter to detect the polarity of the battery, if it is inconsistent with the sign of the polarity of the battery, do not install and use it, otherwise it may burn the electrical equipment of the vehicle.
- (3) Measure the battery open circuit voltage, the terminal voltage should not be less than 12.5V (not less than 12.4V for high temperature type, not less than 12.7V for AGM type) can be used directly, as shown in Table 1, otherwise, it can be used after recharged, see 4.1~4.2 for recharged method.

Table 1: Recharge regulation

| Type | Direct Use | Use afer recharged |
|----------------------------------|-----------------------------|-------------------------|
| Ordinary Flooded Battery | Terminal Voltage ≥ 12.5V | Terminal Voltage <12.5V |
| High Temperature Flooded Battery | Terminal Voltage ≥ 12.4V | Terminal Voltage <12.4V |

| | | |
|-------------|-----------------------------|-------------------------|
| AGM Battery | Terminal Voltage ≥ 12.7V | Terminal Voltage <12.7V |
|-------------|-----------------------------|-------------------------|

- (4) Some of flooded batteries have a state of charge indicator (commonly known as “electric eye”), the displayed state of charge, please refer to Table 2 or the instructions of relevant signs on the battery.

Table 2: Charge Status Indicator

| Color | State of Charge |
|-------|--|
| Green | The state of charge is good |
| Black | Need to be charged |
| White | Insufficient electrolyte, the battery needs to be replaced |

Note: The charge status indicator is just for reference only, It is strictly prohibited to disassemble the indicator without permission.

3.2 Battery Installation

- (1) The battery model must match the automobile. If it does not match, it may not be installed or used normally.
- (2) Before the battery is installed, pull out the car key or turn off the engine to ensure the power supply of the vehicle is in the off state.
- (3) The metal wrench used to install the battery should be insulated to prevent the metal wrench causing short circuit of positive and negative.
- (4) Please follow below steps for replacing the new battery:
 - a. Remove the old battery first, remove the negative (-) wire first, then remove the positive (+) wire, and pay attention to the insulation of the wiring head.
 - b. Clean up foreign bodies on the battery mounting rack to ensure that the bottom of the mounting rack is flat, no foreign bodies or bulge.

c. According to the installation direction of the positive and negative terminals of the old battery, place the new battery upright on the installation rack and ensure that it is implemented.

d. Use a fixator to fix the battery, ensuring that the fixator is pressed tightly and the battery is installed firmly.

e. The positive (+) and negative (-) terminals of the battery are respectively connect with the positive (+) and negative (-) connection wires of the vehicle. Note, that the battery positive (+) is connected with the car generator positive (+) line, then the battery negative (-) is connected with the car generator negative (-) line, positive and negative reverse connection is strictly prohibited.

(5) Install new battery, please follow these steps.

a. According to the positive and negative polarity signs of the mounting rack, ensure the new battery upright on the mounting rack.

b. Use a fixator to fix the battery, ensuring that the fixator is pressed tightly and the battery is installed firmly.

c. The positive (+) and negative (-) terminals of the battery are respectively connect with the positive (+) and negative (-) connection wires of the vehicle. Note, that the battery positive (+) is connected with the car generator positive (+) line, then the battery negative (-) is connected with the car generator negative (-) line, positive and negative reverse connection is strictly prohibited.

(6) After connecting batteries, a small amount of vaseline or anti-rust oil can be applied to the terminal connection parts to prevent oxidation or corrosion of the terminals.

(7) Complete the installation by covering the terminal protection cover (if have) and the battery compartment cover (if have).

3.3 Installation Precaution

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- (1) The battery is installed upright and the installation should be smooth and firm to avoid the battery damage caused by loosening.
 - (2) The battery terminal posts and the wiring head should be kept clean and firmly connected. It is strictly forbidden to knock the terminal posts to prevent acid or liquid leakage caused by loose terminal posts.
 - (3) The vehicle connection wire should be connected directly with the battery terminal, and it is strictly prohibited to place metal gaskets between the terminal and the connection wire clamp.
 - (4) Lock the nut to make sure the connection is firm. If the connection is not strong, spark will be generated, which will cause explosion or terminal post burning.
 - (5) Reverse connection is strictly prohibited, otherwise it will damage the electrical equipment of the vehicle.
 - (6) You have to connect the positive terminal first. If the negative terminal is connected to the car body first, the installation tool may touch the car body and cause a short circuit between the positive and negative terminals of the battery.
 - (7) In for to avoid damage to the car engine, do not run the engine before connecting the battery charge line.
 - (8) Equipped with a driving computer (ECU) vehicle, remove the battery connection line will cause the whole vehicle power off, driving computer zero, please replace the battery in accordance with the requirements of the vehicle manual.

3.4 Battery Usage

- (1) The battery is suitable for automobile starting, ignition, lighting, no need for water refill maintenance during use.
- (2) Exhaust hole should be kept unblocked when the battery is used, and it is strictly forbidden to block or shield the exhaust holes of the battery. In winter, it is necessary to prevent freezing to seal the exhaust holes.

-
- (3) Always check whether the connection part is firm and whether the terminal surface is clean to ensure good contact.
 - (4) It should be fully charged to storage if the battery is not used for long time, otherwise, will affect the service life of the battery.
 - (5) Some vehicles due to functional needs, when parking and shelving, will have a small current consume the battery power, if the parking and shelving time is too long to start difficult, should unload the battery for recharged, the recharge method see 4.1~4.2.
 - (6) The battery should be charged timely when using caused by kinds of reason for lack of electricity, to prevent the battery plates sulfate, resulting in performance degradation.
 - (7) When the vehicle is no use for a long time (generally exceed more than 15 days), the battery should be unloaded or the negative polarity wire on the battery should be disconnected to prevent the battery from over discharged caused by leakage current to failure. When shelving, check the battery charge status and voltage frequently. When the terminal voltage is lower than 12.5V (lower than 12.4V for high temperature type and lower than 12.7V for AGM type), the recharging should be carried out. See 4.1~4.2 for recharged method.
 - (8) Vehicle with start-stop function can only use AGM and EFB series batteries, and flooded battery are not allowed. The corresponding series of batteries should be selected according to the original vehicle battery model series.
 - (9) In the process of battery use, if you have any question, please contact the supplier in time to solve.

4. Recharge

The battery can be recharged by constant voltage and current limiting charging and constant current charging. It is recommended to use constant voltage and current limiting charging and avoid constant current charging as far as possible.

The battery positive terminal should connect with the charger (charging machine) positive terminal, negative terminal should connect with the charge (charging machine) negative terminal. Reverse connection is strictly prohibited, and the connection contact should be good to avoid ignition.

After connecting the wire, turn on the charger machine, set the charging parameters according to the battery type, and then charge.

Before using the charger, check whether the charger matches the battery type. If it does not match, the battery may be undercharged or overcharged, and then damage the battery.

Note, the charging places should be well ventilated, and the environment temperature should be kept at $41^{\circ}\text{F} \sim 86^{\circ}\text{F}$, and the fireworks are strictly prohibited.

4.1 Flooded Battery Recharged

- (1) Use standard battery charger machine to charge, the charging voltage and current should be set according to the following charging parameters.
- (2) Constant voltage and current limiting charging: constant voltage 16.0V ($\pm 0.1\text{V}$) current limiting 0.1~0.2CA charging, until the current is close to 0, and continuous 2~3 hours until stable unchanged. The whole charging time should not exceed 24 hours.
- (3) Constant current charging: constant current 0.05CA charging until the battery terminal voltage is 14.4V, and then continue to charge for 2~3h.

4.2 AGM Battery Recharged

- (1) The special charger for automotive AGM battery should be used for charging. Before charging, check whether the output voltage value of the charger matches.
- (2) Constant voltage and current limiting charging: constant voltage 14.4V ($\pm 0.1\text{V}$) current limiting 0.1 ~ 0.15CA charging, until the current is no change and stable for continuous 2~3 hours. The whole charging time should not exceed 24 hours.

Note, The charging current C refer to the rated capacity of the battery, for example 12V60Ah, $0.1CA=60*0.1=6A$.

4.3 Recharge Precaution

- (1) Batteries must be charged in a well ventilated place, it is strictly prohibited to charge in a closed or poorly ventilated place, sparks, flames and other fire, smoking is strictly prohibited and far away from the crowd.
- (2) The charging machine or charger should be selected from regular manufacture, and the parameters must match the battery type.
- (3) The maximum charging current should not exceed $0.25C$ for recharged.
- (4) The battery can not be charged in parallel to prevent battery damaged caused by bias current. Single voltage should be monitored during series (constant voltage limiting current) charging, which should not exceed the limit value, otherwise the battery will be damaged by overcharging.
- (5) When charging, It is strictly forbidden to collide or touch the charging clip to avoid explosion accident caused by spark.
- (6) In the early stage of charging, should observe and adjust the charging current in time, to prevent burning the motor or other accident caused by excessive current.
- (7) The battery surface temperature should not exceed 113°F during charging process, otherwise the measures should be taken to cool down or reduce the charging voltage and current and so on.
- (8) During charging process, if you find abnormal local high temperature of the battery, abnormal noise and abnormal voltage runout, you should stop charging immediately, and contact the supplier to solve the problem in time.
- (9) After charging stops, should turn off the charging machine and cut off the power supply first. Stand for 30 minutes, after disperse the hydrogen and oxygen gas in the battery and the room, then remove the charging connection wire, and then wipe the

water and dirt on the surface of the battery with a cloth. If there is an oxide layer on the surface of the battery terminals, it can use polished moderately with fine sandpaper.

5. Maintenance

5.1 Basic Maintenance Knowledge

The service life of battery is not only related to product quality and system configuration, but also has a great relationship with the usage and maintenance of consumers. Therefore, it is necessary to master some basic knowledge of battery maintenance.

- (1) When the storage battery exceed more than 3 month at room temperature, or the terminal voltage is lower than 12.5V (lower than 12.4V for high temperature type, lower than 12.7V for AGM type), the battery should be recharged in time to prevent the performance degradation caused by battery sulfated.
- (2) It is forbidden to store the battery undercharged, should be fully charged immediately after used or tested. The storage of undercharged of the battery will lead to the decline of sulphate performance.
- (3) Always check the exhaust vent on both sides of the battery, do not be blocked by dust or ice water,etc.,to prevent the shell deformation, burst.
- (4) The terminal post of the battery should be firmly wired. If the wiring is not strong, it will produce spark, which will cause explosion or terminal post burning.
- (5) Winter temperature is too low, battery performance decline, may not be able to start the vehicle, you can use automobile starter and other auxiliary equipment to start the vehicle.
- (6) If the vehicle long time no use, the negative wire of the battery should be disconnected to prevent the battery electricity leakage and cause overdischarged to failure.

(7) In the late period of battery life, if the battery can not be started for two consecutive times, the battery life may end, and a new battery should be considered.

5.2 Maintenance Procedures

| Item | Period | Content | Standard | Maintenance |
|----------------------|---------------------------|--|---|---|
| Battery appearance | 3 months | Visually check the battery shell and top cover for acid leakage, deformation, crack and damage | Appearance is normal | If the appearance is abnormal, confirm the cause first, if it affects the normal operation, please replace the battery. |
| | | Visually check the connection wires and the terminal, etc., without rust and corrosion | No rust, no corrosion | For minor rust or corrosion, use sandpaper to remove rust and rot, and apply rust inhibitor. For serious rust or corrosion, replace with a new connection cable or battery. |
| Open circuit voltage | Vehicle cycle maintenance | When the vehicle is not starting, use a multimeter to measure the voltage of a single battery | Single voltage is not less than 12.5V (high temperature type is not less than 12.4V, AGM type is not less than 12.7V) | If the voltage is lower than the standard value, the battery should be recharged. If it is still lower than the standard value, the battery should be replaced. |
| Connection wire | Vehicle cycle maintenance | Use a wrench to check whether wiring bolts and nuts are loose. | Connect firmly | Tighten immediately if find loose. |

| | | | | |
|------------------|---------------------------|---|-----------------------------|--|
| Dynamo belt | Vehicle cycle maintenance | Check the tightness of vehicle generator belt and clip | Normal tightness | Beyond the standard, according to the vehicle maintenance procedures to repair treatment |
| Static current | Vehicle cycle maintenance | When the vehicle is not started, measure the static current of the vehicle | Static current <40mA | Beyond the standard, according to the vehicle maintenance procedures to repair treatment |
| Charging voltage | Vehicle cycle maintenance | When the vehicle is started, shut down the load, check the generator charging voltage | Charging voltage 13.8~14.4V | Beyond the standard, according to the vehicle maintenance procedures to repair treatment |

Note: The static current and charging voltage may be different for different vehicle models, the specific regulations of battery maintenance shall prevail.

6. Influencing Factors of The Battery Service Life

Normal use prolong the service life of the battery, abnormal use shortens the service life of the battery or the battery fails to be used. Pay attention to the factors that affect the battery life and avoid them as much as possible. If has the following abnormal conditions, please contact the supplier for technical guidance.

- (1) If the use temperature is too high, the battery life will be shortened.
- (2) If the battery is charged with high current for a long time, will lead to water-loss and life of the battery is shortened.
- (3) If the battery is not recharged after power loss according to the regulations, the battery will be overcharged or undercharged, and the battery service life will be shortened or the battery cannot be used due to faults.
- (4) If the charging voltage of the engine charger is too high or too low, the battery will be overcharged or undercharged. As a result, the battery service life will be shortened or the battery can not be used due to faults..
- (5) Start the engine frequently, will shorten the life of the battery, such as those used for public vehicles.
- (6) The terminal connection loose, which will cause in poor contact and can not start the vehicle, may even spark, cause explosion or terminal post burning.
- (7) The battery is not fixed firmly on the vehicle, frequently shaking will result in internal faults of the battery to can not to be continue used.
- (8) Arbitrarily increase the electrical load of the vehicle, resulting in battery power loss and can not be used normally, and may even appear over discharged and failure.
- (9) The vehicle is shelving for a long time without removing the negative connection line of the battery, the leakage current of the vehicle will lead to the battery over discharged and failure.

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- (10) The generator drive belt is loose, can not normally charge the battery, resulting in the battery insufficient charging and cannot be normal used.
 - (11) The static leakage current of the engine is large, resulting in the failure of the battery due to overcharge.
 - (12) If chose the capacity is lower than the original battery of the vehicle, will lead to failure to start the vehicle, or use a period of time and can not start it normally.

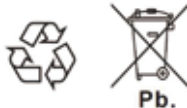
7. Replacement and Recycle

7.1 Battery Replacement

Batteries are consumables and have a certain life cycle. Considering the influence of factors such as use conditions and ambient temperature, before reaching the design life of the battery, with a new battery to replace. Or when the following situations occur, the battery can not continue to be used , should be replaced with a new battery.

- (1) After the battery is charged and maintained, the vehicle still can not be started.
- (2) Do not continue to use the battery when leakage, so as to avoid corrosion of the vehicle and damage to the line.
- (3) Do not continue to use the battery whose shell is severely deformed, otherwise, the battery may leak.
- (4) Do not use the battery whose terminals are seriously corroded. Otherwise, it may cause fire or explode.

7.2 Battery Recycling



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- (1) The battery is marked with recycling mark, which should be recycled by the regular and qualified company or institution, and can also be returned to the supplier for recycling. Do not throw them into garbage cans or discard them at will, which may cause environmental pollution.
 - (2) Batteries can not be recycled with industrial waste.
 - (3) If the waste battery still has power, wrap the terminal and insulate them before neatly packing them into a carton or card board. Then pack the batteries properly to avoid short circuit fire when the terminals of the positive and negative touch each other.
 - (4) Waste batteries still contain electrolyte, it should be kept in upright state during storing and transporting to prevent pollution or accident caused by possible electrolyte leakage.
 - (5) Keep waste batteries away from fire and away from children.
 - (6) Recycling batteries must comply with local laws and regulations. Do not recycle batteries in violation of regulations.

Attached 1: Warranty of Automobile Battery

Dear users, thank you for using our automobile start, start-stop lead acid battery.

The company battery though strict quality control process, reliable quality. From the date of purchase our products, you can enjoy the corresponding services provided by the company. During the warranty period (refer to the contract), the company promises to replace the quality problem of the product itself free of charge. The details are as follows.

1. Contents of Warranty

During the quality guarantee period, if the product fails under normal use, it can be replaced with the same model or the same specifications after inspection and confirmation, and the company is not responsible for any other liability. The warranty period of the product shall be cumulative from the purchase date of the product, but no warranty shall be provide under the following circumstances.

2. Non-applicable Matters

- (1) Use of a purpose other than a vehicle engine, or assemble in mismatched vehicle.
- (2) Out of warranty period.
- (3) Battery failure caused by force majeure such as natural disasters, fires, perils of the sea and turmoil.
- (4) To judge the failure of the battery due to inadequate maintenance, user's fault or other accidents, such as:
 - a. Charging by reversing and inverting the connection of the positive and negative terminals.
 - b. Over discharging or leaving a discharged battery idle.
 - c. The battery shell or the cover is deformed or damaged, or the terminal is damaged and other poor appearance of the battery.

-
- (5) Battery failure caused by the vehicle itself.
 - (6) The customer repairs and refits the battery struction without authorization.
 - (7) A product that can continue to be normally used after being charged.
 - (8) Transfer the vehicle, or install the battery on a vehicle other than the vehicle specified in the warranty.
 - (9) In addition to the standard configuration, the vehicle is overload with electrical products.
 - (10) Failure to follow the instructions to operate.

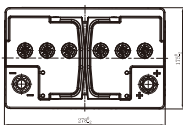
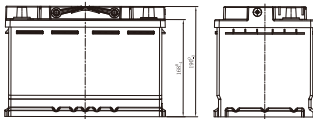
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MARXON®

AGM-L70 (12V70Ah)



Dimensions (mm)



Physical Specification (mm)

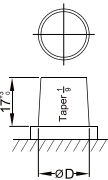
| | | |
|------------------------|-----------------------------|-------------------------|
| Nominal Voltage | | 12V |
| Nominal Capacity(20HR) | | 70Ah |
| Dimension | Length | 278 +0/-2mm(3.07inches) |
| | Width | 175 +0/-2mm(6.89inches) |
| | Container Height | 190 +0/-3mm(7.48inches) |
| | Total Height(with Terminal) | 190 +0/-3mm(7.48inches) |
| Weight | | Approx 21.1Kg(46.53lbs) |
| Standard Terminal | | 1 |
| Cell layout | | 0 |
| Hold-Down | | B13 |
| Cell plate qty | | / |
| Case | | Black-PP Material |
| Cover | | Black-PP Material |
| Handle | | Black-PP Material |
| | | |
| | | |

Electrical Specification

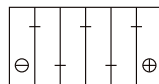
| | | |
|--|--------------------|------|
| Rated Capacity | 20 hour rate(3.5A) | 70Ah |
| Reserve Capacity | 120min | |
| Cold Cranking Performance Amps@0°F (-18°C) | 760A | |

Standard Terminal (mm)

| Terminal Type | D | |
|---------------|----------------------------------|----------------------------------|
| | Positive | Negative |
| 1 | 19.5 ⁰ _{0.3} | 17.9 ⁰ _{0.3} |



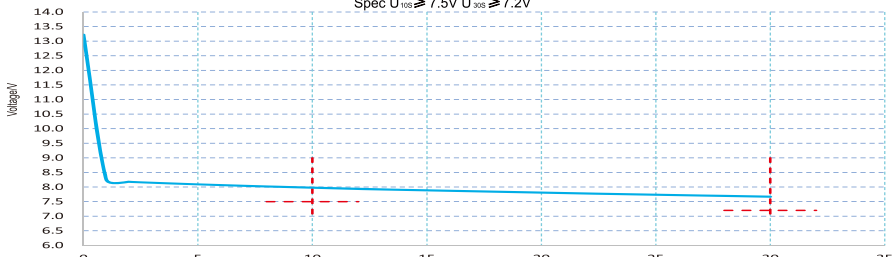
Cell Layout



Figure(0)

Discharge Characteristics(-18°C,0°F)

AGM-L70 (CCA-SAE)
 (CCA-SAE)Capacity Test(@-18)with I=760A
 Spec $U_{10S} \geq 7.5V$ $U_{30S} \geq 7.2V$



ISO9001 IATF 16949 ISO14001 ISO45001

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