












FULBATTM

MOTIVE POWER BATTERY

USER MANUAL FOR FLOODED FDC BATTERIES



Be sure to read this manual and use it correctly before using the battery. Handle this manual as part of the product and keep it close to you. You should hand over products with this manual.

	This symbol is a pictorial indication that act of prohibition.
	This symbol is a pictorial indication that Danger, Warning or Caution.
	This symbol indicates the availability or indication of an action.
	Fire, sparks, naked lights and smoking are prohibited: - Avoid causing sparks when dealing with cables and electrical equipment and beware of electrostatic discharges. - Avoid short-circuits.
	Wear eye protection.
	Keep children away from acid and batteries.
	Corrosive hazard: Battery acid is highly corrosive: - Wear protective gloves and eye protection.
	Instructions must be followed for a safe use of Factory Activated and Sealed Maintenance Free batteries.
	Explosion hazard: - A highly-explosive oxyhydrogen gas mixture occurs when charging batteries.
	Tilt battery may cause electrolyte to leak, do not use it in a tilted condition.
	In contact with (+)terminal or (-) terminal on the body part, can cause an electric shock. so be careful.

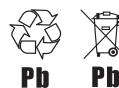


Do not take apart, since there is a risk of the explosions and leaks.



First aid:

- EYES > Immediately hold eyes open and rinse immediately with plain water for at least 15 minutes. Consult a doctor without delay.
- SKIN > Quickly, but gently, wipe acid from skin. Remove any contaminated clothing or footwear and thoroughly wash the affected area with soap and water for at least 15 minutes. Consult a doctor without delay
- SWALLOWED > Do not induce vomiting. Rinse out mouth with water, and if conscious, induce copious drinking of water or milk. Consult a doctor without delay.



Disposal:

- Take old batteries to a proper collection point. The instructions listed under part I must be followed during transportation. Never dispose old batteries in a domestic waste bin.

WARNING

1. Overcharge or charge with incorrect voltage may cause an explosion. Therefore, using a compatible charger with our battery.
2. Do not touch and terminals with metallic tools when handling batteries. May exploded with sparks that caused by a short.
3. Static electricity that generated during winter can cause battery explosion. Be sure to use antistatic spray, gloves, or wet cloth (when cleaning).
4. When a battery is charged, producing hydrogen gas It can ignite the battery, so do not use fire (matches, lighters, cigarette fires, flame from welders or grinder, terminal sparks, etc.) near the battery or take care not to cause sparks.
5. When a leaked electrolyte contacted with the eyes or skin due to careless use of the battery, it can cause blind or you may get burned.
6. Be sure to wear safety goggles, safety helmets, long sleeve cloth, long pants, and safety shoes before you work.
7. Do not open the upper cap of the battery when being charged It can cause scattering of electrolyte.

8. If an electrolyte is leaked due to damage caused by excessive supplement liquid, tilting, or impact, cause a fire. So be sure to read the user manual before use.
9. If the battery does not meet the specification of torque, it can be heated as a result of poor tightening. The spark may cause a fire, so use a torque wrench to meet the specifications.
10. When carrying or hoist, the battery may fall if it is not fully engaged with vehicle. So be careful.
11. When transporting the battery, be sure to check if the floor is slippery, because it can cause falling or electric shock.
12. When charging the battery, hydrogen gas is generated, so asthma or allergy patients have to wear a mask, protective gear, etc before work.
13. When installing the battery, make sure that polarity is not reversed and use it if it is normal.

BEFORE USE

- When the battery arrives, be sure to check leak of electrolyte, heat, etc. using battery with leak of electrolyte may cause electric shock and fire.
- Check the charging plug and cable is damaged before use. Using damaged charging plug or cable may cause a fire.
- The «DRY» state of the battery is not injected electrolyte. So may cause an explosion when charging. Never charge a battery in a «DRY» state.
- Inject electrolyte to the specified level of the battery before using.
- Leaked electrolyte may cause blindness or burns if contact with the eyes or skin.
- Be sure to wear safety goggles, protective helmets, long sleeves, long pants, and safety shoes before you work.
- Be sure to remove the plastic packaging before using the battery. Charging or operating without removing plastic packaging may cause explode.
- Please ensure that the battery specification matches the type specified by the vehicle you intend to drive. Using an inconsistent battery will cause poor performance and damage to the vehicle during operation.

INSTALL & EXCHANGE INSTRUCTIONS

- Do not touch (+) and (-) terminals with metallic tools when handling batteries. May exploded with sparks that caused by a short.
- If an electrolyte is leaked due to damage caused by excessive supplement liquid, tilting, or impact, cause a fire. So be sure to read the user manual before use.
- If the battery does not meet the specification of torque, it can be heated as a result of poor tightening. The spark may cause a fire, so use a torque wrench to meet the specifications.
- When carrying or hoist, the battery may fall if it is not fully engaged with vehicle. So be careful.
- When transporting the battery, be sure to check if the floor is slippery,

because it can cause falling or electric shock.

- Contact your place of purchase to replace the battery. Incorrect replacement may cause battery damage.

CHARGING INSTRUCTIONS

- Charge the discharged battery as soon as possible.
- The charging method is divided into constant voltage/current charging. Follow the instructions on the manual.
- Do not install chargers in areas with poor ventilation, high temperatures, high humidity, or corrosive gases.
- Charging is automatically terminated according to the timer. Appropriate charging completion standards are indicated as follows:
 - Between 110~125% of the discharged amount has been charged.
 - The voltage reaches its peak and retain normal voltage more than one hour.
 - Specific gravity of the electrolyte after charge is approximately 1.280 (25°C);
- When the battery is used at low temperatures, the electrolyte temperature should be kept above 15°C. If the temperature inside the electrolyte of the battery is below 5°C, the internal resistance of the battery increases rapidly and the charging efficiency decreases, so the charging amount need to be adjusted according to the temperature.

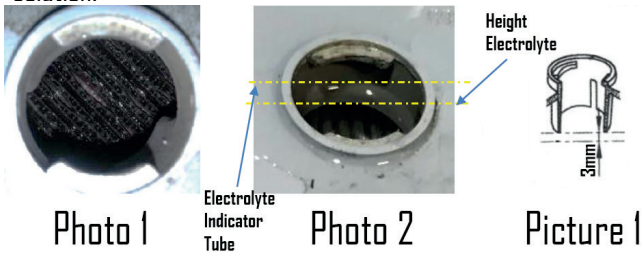
Temperature of electrolyte	5°C ~ 25°C	-10°C ~ 5°C	-15°C ~ -10°C	-15°C ~ -16°C
Charging amount	110~125%	125~140%	140~150%	Can't charge

Therefore, the low temperature area requires separate charging room. Keep the room temperature of charging room between 5°C and 25°C.

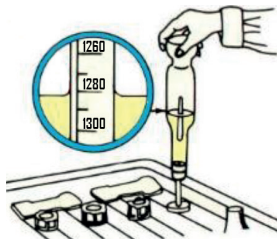
- Charging: The battery capacity is slowly reduced by self discharge even if not used. Be sure to charging once every three months according to manual.
 - Charge the battery with a charger that matches the capacity and voltage of the battery. If charge not proper chargers, not sufficiently charged or may cause leak of electrolyte, heat or short.
 - Keep electrolyte temperature below 55°C during charging. rise in temperature may cause fluid leaks.
 - The battery will ignite with hydrogen gas during charging, so be careful not to bring fire near the battery (match, lighter, cigarette fire, flame from the welder or grinder, terminal sparks, etc.).
 - When charging the battery indoors, ensure sufficient ventilation. Hydrogen gas produced during charging cause ignition/explosion.
 - Do not change the maximum voltage of the charger without consulting with manufacturer. Input too high voltage causes the battery overcharging, temperature increases and shorten battery life.
 - Overcharge and lack of charge can cause shorten battery life.
- Method of proper charging:
- Set timer(for manual timers).
 - Select charger capacity according to battery capacity.
 - Set charger voltage.

LIQUID AREA CHECK & REPAIR

- Refer to the figure below to manage the Liquid area of the electrolyte solution:



- If the part of the plates and isolates are shown as shown in the lowest face value Photo 1, add purified water quickly. Top up the purified water to the 3mm location of the face indicator tube as shown in Figure 1. Too much purified water, as shown in Photo 2, may cause excess fluid.
- The condition of the battery can be determined by the ratio of the measured electrolyte to the specific gravity of the electrolyte.
- Measure the electrolyte gravity once a month and at the beginning at full charge, 1.280 (25°C), and ensure normal levels. The specific gravity of the electrolyte is based on 25°C, so use the following equation:
 $D25 = D_t + 0.0007(t - 25)$ where D25: 25°C calculated as D25: 25°C Weighted (t): The temperature of the electrolyte when weighed (°C)



- Do not lower the electrolyte below the base line. It can cause explode.
- Do not add anything to the battery except purified water. If another material enter, may cause heat, explosion and generate toxic gas.
- If an electrolyte is leaked due to excessive electrolyte supplement or tilting or damaged by impact, may cause fire. So be sure to read and acquainted to the user manual before use.
- During electrolyte supplement, electrolyte may leak and cause blindness or burns if contact is made with the eyes or skin.
- Be sure to wear safety goggles, protective helmets, long sleeve clothes, long pants, and safety shoes before you work.
- Do not check and repair batteries except trained engineer or professional. You can hurt by explosion, electric shock or electrolyte leakage.
- If you use battery when electrolyte level is below the base line, makes battery life shorter. So please check once a week.
- Supplement purified water to appropriate level. If not, electrolyte will be overflow and corrode, discoloration of caps, lower electrolyte gravity.

CLEANING & DAILY INSPECTION

- If some material are attached to the top or connections of the battery, they may cause explosion or fire. Using a wet cloth to clean regularly.
- Do not use organic solvents, detergents or chemicals such as benzene,

cinnna or gasoline when cleaning the battery. Damage to the battery and leak of electrolyte may occur due to organic solvents.

- Do not wash when the battery was not separated. It can cause explosion.
- If the battery is not in use for a long period of time, do not leave it in not ventilated area or near fire. It can cause an explosion.
- When unplugging the charger, make sure that both the vehicle's key switch and the charger's switch is OFF. It can cause explosions.
- Replace cables or plugs immediately if damaged. If used in a damaged condition, a fire may occur.
- Do not tamper with cables or plugs. It causes heat and explosion.
- Connect the plug completely when use. Heated plug may cause a fire/explosion.
- Do not leave metal objects on top of the battery, such as spanner. It causes explosion.
- Fix the (+), (-) terminals and cables before use. If used unsecured, it can cause sparks to fire or explode.
- When storing batteries, avoid unstable areas and do not place them in areas where drops and rainwater enter. rainwater can cause a fire/explosion.

BATTERY DISPOSAL

- Keep the battery out of the child's hand, or may cause blindness/burn.
- Do not touch (+) and (-) terminals with metal tools to used battery. sparks induced by short may cause an explosion.

GENERAL DETAILS

- Acid remaining in a battery that has reached the end of its life is classified as designated waste and shall be collected and transported by the person who reports it to the Mayor/the Provincial Governor by equipping the facilities and equipment according to the Article 46 set by the Department of the Environment.
- Collect or transport waste battery from unauthorized companies, will be face up to 20 million won in fines or up to two years in prison according to Article 66-(2) of the Waste Management Act. The battery shall not be dumped in a place other than a facility or a place prepared for the collection of waste under Article 8 of the Waste Management Act.
- Do not throw away disposal batteries with general waste because they will be recycled.
- Please ask disposal batteries to take over the place where you purchase it.



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