

# SAMSUNG LITHIUM-ION BATTERY PACK

## LITHIUM-ION BATTERY PACK

The lithium-ion battery pack in this vehicle is maintenance free. There is no maintenance required for the battery pack. Charge the battery pack using only the OEM approved Lithium-Ion battery charger.

### **WARNING**

Improper handling of the battery pack and electrical components can result in serious injury or death.

Do not attempt to remove the battery pack or battery cables. Do not use the battery pack without the control module installed. All battery pack and electrical service must be performed by an authorized service facility.

All tools used in or around the battery pack area should be insulated. Do not intentionally cause a short to the power terminal (P+, P-, B+, B-) with a metallic object.

Do not use the vehicle or charge the battery pack if the battery pack has become abnormally hot, is discolored, deformed, leaking or has an odd odor. If liquid from the battery pack leaks onto skin or clothes, wash well immediately with fresh, running water. If liquid gets into the eyes, do not rub the eyes. Wash the eyes with fresh, running water and seek medical assistance immediately.

Do not disassemble or modify the design, including the electrical circuit, of the battery pack or control module.

To prevent the risk of battery pack explosion, keep all flammable materials, open flames, or sparks away from the batteries. Do not leave the battery pack near a fire or heat source. Do not throw Lithium-Ion batteries into a fire. Do not apply heat to any part of the battery pack or battery management module with a soldering iron. Do not place the battery pack in a microwave oven, dryer, or high-pressure container.

Make sure that the key switch is in the OFF position and the run/tow switch is in the RUN position before servicing the vehicle.

Do not attempt to operate the vehicle or charge the battery pack at temperatures above 140°F (60°C).

Do not immerse or throw the battery pack in water. Do not pressure wash the battery pack.

Do not puncture the battery pack or control module. Do not strike the battery pack with a hammer or heavy weight. Do not step or stand on the battery pack. Do not throw or drop the battery pack on hard surfaces.

If the battery pack terminals are contaminated or dirty, clean them with a dry cloth before using the battery pack.

Keep the battery pack and control module away from static electricity.

Before recycling or shipping battery pack, make sure that the battery pack terminals are insulated.

**Lithium-Ion batteries are recyclable:**

- Return discarded batteries packs to distributor or manufacturer for recycling.
- Contact local or state environmental department for the disposal information.

**NOTICE**

When Li-ion batteries are put into a municipal recycling bin, they will end up at a municipal recovery facility (MRF) that is typically equipped to recycle only household paper, plastic, metal, and glass. When this happens, the batteries can become damaged or crushed during processing and may become a fire hazard. It is important to note that the chasing arrow symbol (i.e three arrows forming a triangle) on Li-ion batteries means that these batteries can be recycled at specialized battery recyclers. It does not mean that Li-ion batteries can be placed in municipal/household recycling bins.

**BATTERY CHARGING AND MAINTENANCE**

**WARNING**

Do not attempt to start the vehicle or charge the battery pack if the vehicle has been stored at or below freezing temperatures.

Do not spray the battery pack with water. Do not attempt to add water to the battery pack.

Do not charge the batteries if the ambient temperature is below -4°F (-20°C) or above 113°F (45°C). Refer to the appropriate appendix for battery charger operating instructions.

Before connecting the battery charger:

- Park the vehicle, turn the key switch to the OFF position and remove the key.
- Inspect the charging receptacle for dirt or debris. Remove dirt or debris if found.
- Inspect the charger cords and plugs for cracks or damage. Replace any damaged cords before use.
- Plug the charger into a receptacle on a dedicated circuit. Do not connect any other devices to the receptacle.
- Connect the charger to the vehicle.

**BATTERY CHARGING**

The battery charger is designed to completely charge the battery pack. If the battery pack is severely discharged the charger will indicate a fault. The automatic charger determines the correct length of

charge for the battery pack and turns off when the battery pack is charged. Always refer to the instructions supplied with the charger. See Appendix A in the back of this manual for charger operating instructions.

The battery management system (BMS) and charger cooperate to make sure that charging occurs at the proper rate for the battery temperature. When the battery charger is connected to the vehicle, it will determine the charge rate based on the battery temperature. The charger will operate at the rates shown in the table below.

The BMS will adjust the charge rate based on the temperature of the batteries. Use only the OEM approved Lithium-Ion battery charger for your vehicle. See charger operating instructions in the Appendix.

- Turn the key to the OFF position and remove it from the vehicle.
- Inspect the charger cord for cracks, frayed wires or loose connections. If damaged, replace it.
- Inspect the vehicle charger receptacle and charger plug for dirt, debris or damage. Clean if necessary and replace immediately if damage is found.
- Connect the charger to a wall receptacle. Do not use a multi-plug adapter or power strip. Do not connect anything else to the same receptacle.
- Connect the charger to the vehicle receptacle.

When the battery pack is finished charging, disconnect the charger cord from the vehicle. If disconnecting before the charge cycle is complete, it is recommended that the charger be disconnected from the wall receptacle first, then unplug the charger from the vehicle receptacle.

## **AC Voltage**

The battery charger output is directly related to the input voltage. If the vehicle receives an incomplete charge in a normally adequate time period, low AC voltage can be the cause. Consult an electrician if necessary.

## **BATTERY PROLONGED STORAGE**

### **CAUTION**

Improper storage may damage, destroy, or cause permanent loss of battery pack capacity. Do not exceed storage time or temperature limits. The battery pack must be charged to the correct level before storage. Storing fully depleted battery packs will make them permanently unusable.

## **STORAGE PREPARATION**

The optimum storage temperature range is between 65°F and 82°F (18°C and 28°C)

- Charge the battery module based on climate during storage period.
  - In cold climates, fully charge the battery pack. Make sure that the charging operation is complete and there are no faults displayed on the charger. The green light on the charger should be on which indicates that the charge cycle is complete.
  - In hot climates, store the vehicle with a 30% to 50% charge of battery pack capacity.
- Turn the key switch to the OFF position and remove the key from the switch.
- Check the Run - Tow switch under the seat, make sure it is set in the RUN position.
- Turn off all accessories.

The storage time for properly charged Lithium-Ion batteries supplied with this vehicle varies based on the ambient temperature.

Temperature	Length of Storage Time
-22°F to -4°F (-30°C to -20°C)	One month at 100% battery charge, all accessories turned off
-4°F to 113°F (-20°C to 45°C)	Six months at 100% battery charge, all accessories turned off.
113°F to 140°F (45°C to 60°C)	One month at 30% - 50% charge, all accessories turned off.

### **SETTING STATE OF CHARGE (SOC)**

The optional SOC meter or the hand held programmer may be used to determine the state of charge of the battery module. If the SOC is below 30%, charge the battery module until the state of charge reaches 50%. The charge cycle may be interrupted by disconnecting the charger from the AC power source first, then from the charging receptacle on the vehicle. If the SOC is above 50%, operate the vehicle until the SOC is below 50%.

### **DURING STORAGE**

Check the state of charge every 30 days. If the SOC is below 30%, charge the battery pack until the state of charge reaches 50%.

### **EXTREME LOW TEMPERATURE STORAGE**

If the ambient temperature is below -4°F (-20°C) DO NOT:

- turn the vehicle key to the ON position
- drive the vehicle
- tow the vehicle
- charge the vehicle

- operate accessories
- turn the lights on (if equipped)

### **RETURNING VEHICLE TO SERVICE**

At the end of the storage period, charge the battery pack to 100% before operating the vehicle. Before charging the vehicle be sure that the ambient temperature is between 14°F (-10°C) and 113°F (45°C) and the vehicle has had time to adjust to the temperature.