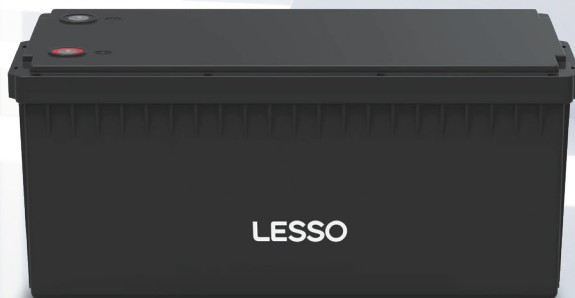


LESSO GROUP
STOCK CODE: 2128.HK

LESSO

Battery Module User Manual

LSMO25.6V120AH-ZY



Document Revision: V1.0

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1. Features of Battery Module

- **Longer Cycle Life:** life than lead acid battery, helping to minimize replacement cost and reduce total cost of owner.
- **Lighter Weight:** About 40% of the weight of a comparable lead acid battery. A 'drop in' replacement for lead acid batteries.
- **Higher Power:** Delivers twice power of lead acid battery, even high discharge rate, while maintaining high energy capacity.
- **Wider Temperature Range:** -20°C~60°C.
- **Superior Safety:** Automatic protection with internal battery management system. Lithium Iron Phosphate chemistry eliminates the risk of explosion or combustion due to high impact, overcharging or short circuit situation.
- **Increased Flexibility:** Modular design enables deployment of up to two batteries in series and up to four batteries in parallel.

2. Application

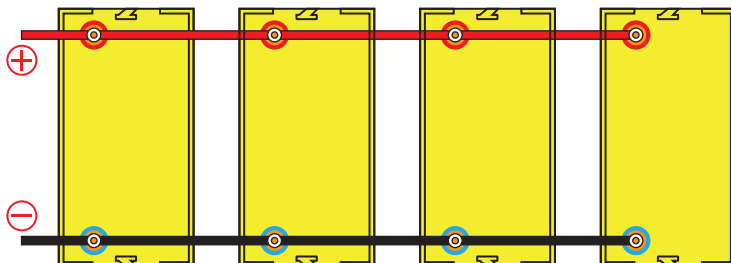
Electric vehicles, electric mobility; Solar/wind energy storage system; UPS, backup power; Telecommunication; Medical equipment; Lighting.

3. Battery Specification

| MODEL | LSMO 25.6V120AH-ZY | |
|-----------------------------|---|-----------------------|
| Nominal voltage | 25.6V | |
| Nominal capacity | 120A | |
| Nominal energy | 3072Wh | |
| Standard charge voltage | 29.2V | |
| Discharge cut-off voltage | 18.4V | |
| Standard charge current | 50A | |
| Allowed Max. charge current | 100A | |
| Max. discharge current | 100A | |
| Terminal | F12 M8 | |
| Temperature | Charge temperature: 0°C~+50°C / Discharge temperature: -20°C~+60°C | |
| Cycle life | ≥4000 cycles @25°C | |
| Storage environment | ≤1 Month | -20°C~+60°C / 5~75%RH |
| | ≤6 Months | -10°C~+45°C / 5~75%RH |
| | Recommend environment | 15°C~35°C / 5~75%RH |

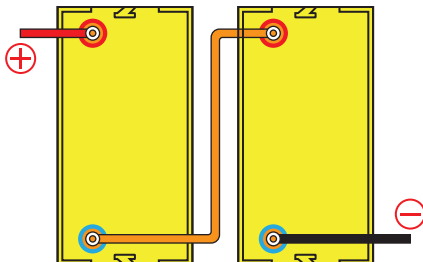
4. Parallel and series batteries

4.1. Parallel connection of batteries



| Capacity of Parallel Battery | Battery Numbers | Charge | Discharge |
|------------------------------|-----------------|-----------------|-----------------|
| | | Limited Voltage | Cut-off Voltage |
| 24V / Capacity *1 | 1 pcs | 29.2V | 18.4V |
| 24V / Capacity *2 | 2 pcs | 29.2V | 18.4V |
| 24V / Capacity *3 | 3 pcs | 29.2V | 18.4V |
| 24V / Capacity *4 | 4 pcs | 29.2V | 18.4V |

4.2. Battery in series



| Inverter / Charger Type | Battery Numbers | Charge | Discharge |
|----------------------------|--------------------|-----------------|-----------------|
| | | Limited Voltage | Cut-off Voltage |
| 24V | 1 pcs | 29.2V | 18.4V |
| 48V | 2 pcs | 58.4V | 36.8V |

4.3. Notes for series and parallel connection:

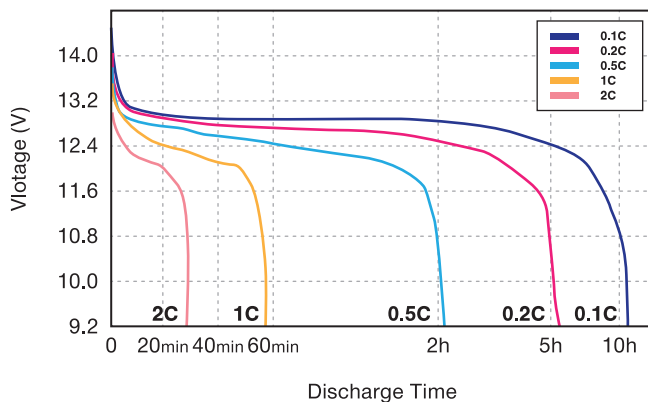
- Fully charge all the battery firstly, then connect them in series of parallel.
- The number of batteries in series is ≤ 2 pcs, and the number of batteries in parallel is ≤ 4 pcs. It is forbidden to mix multiple series connection and multiple parallels connection.
- Do not mix in series or parallel with lead-acid batteries or different types of lithium batteries; (Only use batteries with the same type (lead-acid battery or lithium), and same capacities.
- Battery series and parallel connections need to be charged according to the standard charging voltage in the above table, and a special charger for lithium batteries is recommended; (Follow note 4.1 and 4.2 as above when selecting proper chargers).

5. BMS Electrical Characteristics

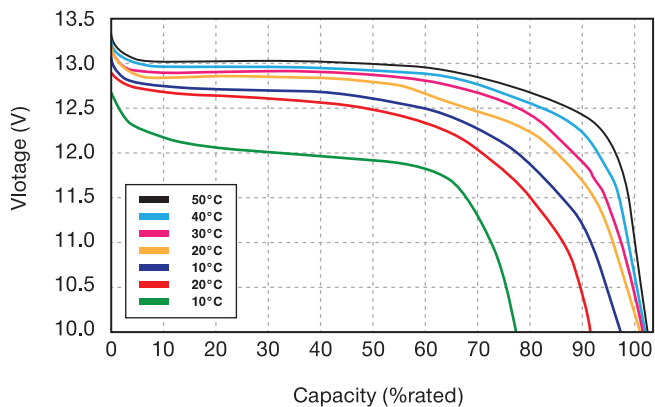
| Item | Content | Criterion |
|---------------------------|---------------------------------------|----------------------|
| Voltage | Charging voltage | DC: 29.2V 3.65V/Cell |
| | Balance voltage for single cell | 3.65V/Cell |
| Current | Balance current for single cell | 36mA |
| | Max. continues charge current | 100Ah |
| | Max. continues discharge current | 100Ah |
| Over charge protection | Over charge detection voltage | 29.2V 3.65V/Cell |
| | Over charge release voltage | 28.4V 3.55V/Cell |
| Over discharge protection | Over discharge detection voltage | 18.4V 2.30V/Cell |
| | Over discharge release voltage | 21.6V 2.70V/Cell |
| Over current protection | Over discharge current detection | 2.5~3.5C |
| | Over charge current detection current | 1.0~1.5C |
| Short protection | Short circuit protection current | 8.0~12C |
| Temperature | Charging temperature protection | ≥+50°C or 0°C |
| | Discharging temperature protection | ≥+70°C or -20°C |

6. Characteristics of Battery Module

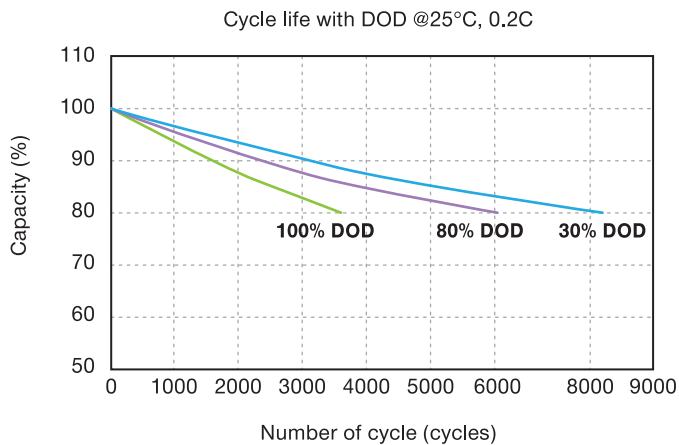
6.1. Different rate discharge curve @25°C



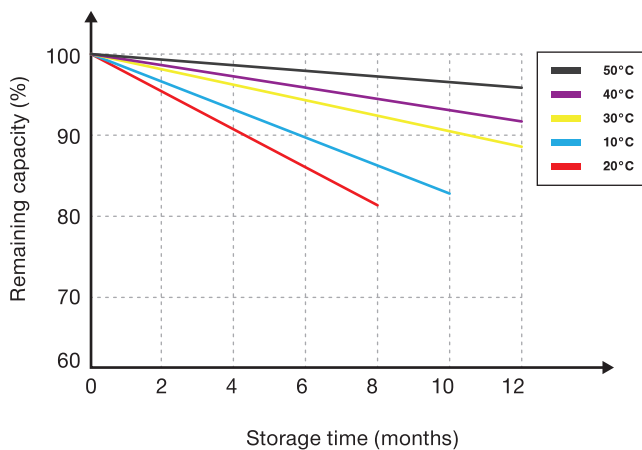
6.2. Different temperature discharge curve @0.5C



6.3. Different DOD discharge cycle life curve



6.4. Different temperature self discharge curve



7. Troubleshooting

Solutions to general failures of lithium iron phosphate batteries:

| Problem | Solution |
|---|--|
| The battery pack cannot be discharged properly | 1. Check whether the battery connection is loose or not; |
| | 2. Make Sure the battery terminal posts were connected correctly and firmly; |
| | 3. Switch off the load and switch on again after 3 seconds. |
| The battery pack cannot be charged properly | 1. Use chargers with compatible output; |
| | 2. Only connect to electric appliances with compatible input. |
| The battery heats up when using | 1. Make sure the appliance connected are compatible and not overloaded; |
| | 2. Connect the battery packs correctly and firmly. |

8. Warning & Tips

1. Disassemble or modify the battery is forbidden.
2. Do not reversely connect or short-circuit the positive and negative poles of the battery; do not mix the battery with metal objects avoid short circuit from metal objects touch the positive and negative electrodes of the battery, damaging the battery or even causing danger.
3. It is strictly forbidden to immerse the battery in sea water or throw it into fire.
4. It is strictly prohibited to use chargers that do not meet the requirements for charging.
5. Avoid frequent overcharging. Overcharging will cause the internal temperature rise and harmful to the lithium-ion battery and charger.

6. When long-time storage, the battery SOC is 30% ~ 50% , if high-SOC storage will accelerate the battery capacity degradation. The battery need to be charged every 6 months if out of use No fall down, no pile up over 5 layers, and keep face up.

9. Storage

1. Basic requirements:

- (1) Lithium batteries and lithium battery packs are dangerous goods; in order to ensure the safety of subsequent handling and transportation, all lithium batteries (groups) must pass the UN38.3 test;
- (2) Due to the characteristics of lithium batteries, the storage environment should be within 18 - 25 degrees.
- (3) Humidity requirements: effectively control the humidity of the warehouse to avoid extreme humidity in the warehouse for a long time (relative humidity higher than 90% or lower than 40%).
- (4) The lithium battery warehouse should be physically separated by brick walls, and the warehouse must adopt closed, explosion-proof or other corresponding safety electrical lighting equipment.
- (5) The place where inflammable and explosive materials are stored should be equipped with fire-fighting equipment of sufficient variety and quantity, and they should always be in good condition.
- (6) Where there are lithium batteries, there must be some prohibited regulations such as no smoking
- (7) It is not allowed to carry out operations that may cause fire near warehouses and sites where flammable and explosive materials are stored

2. Storage requirements:

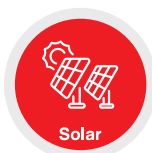
- (1) Batteries should be stored in a well-ventilated, dry and cool place. High temperature and high humidity may damage battery performance and/or corrode battery surface.
- (2) Battery cartons should not be piled higher than the specified height. If too many battery cartons are stacked together, the batteries in the bottom cartons may be deformed and may leak.
- (2) Battery cartons should not be piled higher than the specified height. If too many battery cartons are stacked together, the batteries in the bottom cartons may be deformed and may leak.

- (3) Batteries should not be stored or displayed in places exposed to direct sunlight or exposed to rain. If the battery is wet, the insulation resistance will decrease, self-discharge and rust may occur. Rising temperatures may damage the battery.
- (4) Store and display the batteries in the original packaging. After the packaging is removed, the batteries are piled up randomly, which may easily cause short circuit and damage to the batteries.
- (5) Items that are likely to cause combustion and explosion in contact with each other and items with different fire extinguishing methods should be stored separately.

3. Handling requirements:

- (1) When handling materials, no matter what kind of handling tools are used, they should be handled properly to prevent materials from falling or being damaged.
- (2) When carrying out material handling, issues such as load, stacking, and directionality should be considered.
- (3) When using forklifts or carts, the loading method should be heavy first and then light. The transported materials should not exceed the width and height of the passage and elevator doors, and the speed should be moderate.
- (4) The mover should use qualified handling tools (forklift, cart, etc.).
- (5) The battery carton should be loaded and unloaded carefully. Rough handling may cause a short circuit or damage to the battery, resulting in leakage, explosion or fire.

The battery has specially been designed to provide energy for:



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