TECHNICAL DATA SHEET

D12-20



Applications



1. General Information

This specification sheet defines the performance of rechargeable LiFePO4 battery pack LIT/D12-20 sold by Battery Supplies and describes the type, performance, technical characteristics, warning and caution of the battery pack.

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2. Battery Specification (@ 25±5 °C)

NO	Items		Characteristics
2.1	Normal capacity		20Ah
2.2	Nominal energy		256Wh
2.3	Nominal voltage		12.8V
2.4	Internal resistance		≤30mΩ @1kHz AC
2.5	Normal charge voltage		14.6±0.5V
2.6	Float charge voltage		14.4±0.2V
2.7	Allowed MAX charge current		25A @ 25±5℃
2.8	Recommended charge current		≤ 10A
2.9	Allowed MAX discharge current		25A (30mins @ 25±5℃)
2.10	Pulse discharge current		60A (3S)
2.11	End of discharge voltage		10.0V
2.12	Dimensions		Length 181 ±2mm
			Width 76 ±2mm
			Height 166 ±2mm
2.13	Weight (No accessories)		About: 3.0±0.5Kg
2.14	Operation temperature	Charge	0~45℃
		Discharge	-20~60℃
2.15	Self-discharge rate	Residual capacity	≤3%/Month; ≤15%/ year
		Recover capacity	≤1.5%/Month; ≤8%/ year
2.16	Storage environment	≤1month	-20~+60℃, 45~75%RH
		≥3months	-10~+45℃, 45~75%RH
		Recommended environment	15~35℃, 45~75%RH

3. Electrical Characteristics & Test Condition

Testing Conditions

Ambient Temperature: 25±5℃

Humidity: less than 45%~75%.

Normal charge

"Normal charge" means at 25±2°C charge battery under CC(0.33C)/CV(14.6V) mode until over charge protection or the charge current reduce to 0.05C, and then rest for 1h.

Quick Charge mode
"Quick Charge" means at 25±2°C charge to limit voltage with 0.5 C constant current, then charge with constant voltage until current less than 0.02ItA.
Standard Discharge Mode
"Standard Discharge" means at 25±2 ℃ discharge to the cut-off voltage with 0.33C current.
Quick Discharge mode
"Quick Discharge" means discharge to the cut-off voltage with 0.5C current.

NO	Items	Criteria		Condition
3.1	Normal Capacity	20Ah (SOC≥97%)		After **normal charge**, discharge @0.33C current to the end of discharge voltage.
3.2	Internal Impedance	≤30mΩ		@50% SOC @1kHz AC internal resistance test instrument.
3.3	Short circuit protection	Auto cutoff load when short circuit		Connect the positive and negative of this battery pack through a lead with 0.1Ω resistance.
3.4	Cycle life @DOD100%	≥2000 cycles		After **normal charge**, discharge @0.33C current to the end of discharge voltage. Repeat above process until discharge capacity reduces to 80% of initial value.
3.5	Discharge temperature characteristics @0.33C	-20°C (6h)	≥70%	Capacity @specified temperature Capacity @ 25℃
		0°C (6h)	≥80%	
		25°C (4h)	≥100%	
		55°C (4h)	≥95%	
3.6	Capacity retention rate	remain capacity ≥96%		After **normal charge**, store the battery @25±5°C for 28 days, then discharge capacity @0.33C, the retention capacity accord with criteria.

4. Circuit Protection

The batteries are supplied with a Battery Management System (BMS) that can monitor and optimize each single prismatic cell during charge & discharge, to protect the battery pack from overcharge, over discharge, short circuit. Overall, the BMS helps to ensure safe and accurate running.

No	Item	Content	Criterion
4.1	Over charge	Over-charge protection for each cell	3.75±0.05V
		Over-charge release for each cell	3.6±0.05V
		Over-charge release method	Under the release voltage
4.2	Over discharge	Over-discharge protection each cell	2.5±0.05V
		Over-discharge release for each cell	2.8±0.05V
		Over-discharge release method	Charging(*)
4.3	Over current	Charge over current protection	25A
		Charge over current release	After removing the load or charging
		Discharge over current protection	25A
		Discharge over current release	After removing the load or charging
		Short circuit protection	Yes

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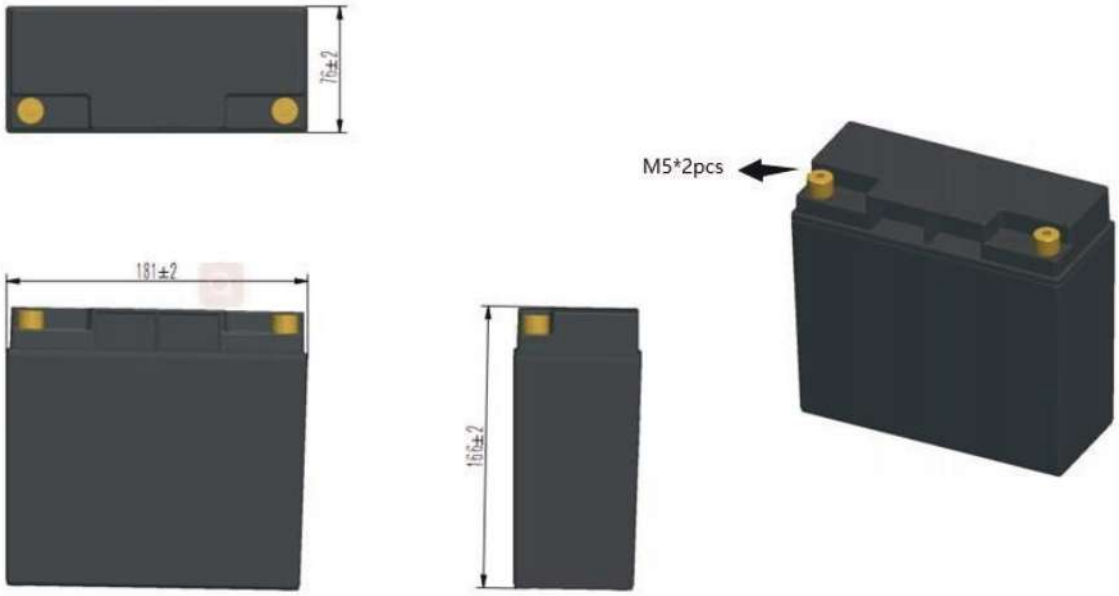
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4.4	Temperature	Charge over temperature protection	65±3°C
		Charge under temperature protection	-10°C; 0°C recover
		Discharge over temperature protection	65±3°C
		Discharge under temperature protection	-10°C; 0°C recover

(*) try to avoid over discharge. If charging is not enough to release the battery: please contact Battery Supplies for further advice.

5. Structure Dimension

Battery Dimension



6. Transport & Storage

Proper transportation and storage of Li-ion battery packs is critical. Ensure this section is followed carefully to avoid damage to the pack and injury to the user.

- The battery should be stored at 50% SOC during transport.
  Suggested method: charge the battery to 14.6V and discharge again until it reaches the discharge cutoff voltage of 10V. Then charge the battery up to 50% SOC and store in proper circumstances according to specification.
- Keep the battery out of the sun and rain during transport.
- Do not place any heavy objects on the battery during transport.
- Do not transport the battery with flammable material, explosives or sharp objects.
- Follow local regulations concerning transport of Li-ion batteries. Use the original packaging or make sure your packaging is in accordance with regulations of Li-ion transportation.
- Handle the battery pack and cells with care when assembling and disassembling, do not drop or excessively shake.
- Keep the battery safe from dropping and turning over. Do not stack over 6 layers.
- The battery should be stored in the warehouse between 15°C and 35°C in a dry, clean and well-ventilated environment without direct sunlight shining on the battery permanently.
- During storage, the battery needs to be charged every 6 months.

7. Warnings & Tips

Please read and follow the operation instructions before use. Improper operation may cause overheating, fire, rupture, damage or capacity deterioration of the battery. Battery Supplies is not responsible for any accidents caused because of not following our instructions.

Warning

- Battery must be kept away from heat sources, high voltage, and can't be exposed to direct sunlight for a long time.
- Never throw the battery into water or fire.
- Do not connect the battery to a charger or put the battery in equipment with terminals connected in reverse.
- Never connect the positive and negative terminal of the battery with metal.
- Avoid excessive physical shock or vibration. Don't hit, drop or crush the battery.
- Never disassemble the battery without manufacturer's permission and guidance.
- Never use the battery mixed with other batteries from different manufacturer or other types/models of batteries.

Tips

- Keep the battery away from high temperature. It will cause the battery to heat, catch fire or lose function and reduce the life of the battery.
- When your battery has run out of power, charge immediately.
- Please use the matched or suggested charger for this battery (see: 9. Advised charger)
- If the battery emits a peculiar smell, heating, distortion or any abnormality appears, please stop using.
- If the battery leaks and substance gets into eyes or onto skin: do not wipe. Instead, rinse profusely with water and see a doctor immediately.
- Keep away from children and pet animals.

8. Series – parallel connections

General

- Only connect batteries in parallel **OR** series.
- Only connect new batteries from the same production batch.
- Only connect batteries of same capacity and voltage.
- Avoid differences in the distances and sections of the cables; place the cables diagonal.
- Always start by charging the batteries separately to 100%. Then disconnect from the charger and check if all batteries are 100% charged. If this is okay, then you may continue with connecting the batteries.

Parallel connection

- Do not connect more than 4 batteries in parallel.
  Battery Supplies advises 2 batteries in parallel; max 4.
- Install a fuse on the positive side of each battery, corresponding with the max. discharge current.
- When parallel connected batteries are discharged (completely or partially), it's damaging to replace 1 battery with a fully charged battery.
  So first disconnect all batteries. Then charge all batteries separately to 100% and only then you may connect them in parallel again.
- Only use parallel connection to increase total capacity and autonomy. Do not increase the total current: Max. current of the unity is equal to the max. current of 1 battery.

Serial connection

- Only connect 12V batteries in series.
- Do not connect more than 4 batteries in series.
- To avoid unbalance between the batteries, we advise to charge every battery with a separate 12V charger. It's not necessary to disconnect the batteries, provided that the chargers do not share the negative terminal.
  If this requirement cannot be met, then we strongly suggest to consider buying a 24V, 36V or 48V battery instead of connecting 12V batteries in series.

9. Advised charger

LIT/04.01.0053
LAD/AQHF-WP SLA
In case of using a different charger than advised here above, please check the specifications of the battery very carefully.

10. Battery operation instructions

Charge and discharge

Charging current: Do not surpass the largest charging current stipulated in the specification.
Charging voltage: Do not surpass the highest limited voltage stipulated in the specification.
Charging temperature: use within temperature range stipulated in the specification
Charge with constant current, then with constant voltage. No reverse charge, which is dangerous.
Special note: over charge or over discharge can affect the functions of the battery and ultimately lead to battery failure or serious safety hazards. If long time floating is required, please use the recommended floating model specification. When the battery is not being used for a long time, it will self-discharge. It's important to maintain the batteries while being stocked or out of service. Always try to keep the voltage at 50% SOC (state of charge)/

11. Other chemical reaction

Because of chemical reaction, the battery performance will deteriorate over time even if the battery is stored for a long period of time without being used. In addition, if the various usage conditions such as charge, discharge, ambient temperature etc. are not maintained withing the specified ranges, the life expectancy of the battery will be shortened.