Cylindrical lithium ion battery specification

Battery model : 142-103

1 Scope of application

This specification specifies the technical requirements, test methods and precautions for cylindrical lithium-ion batteries produced by Parts Express. If you need to obtain technical requirements other than this specification, please contact Parts Express.

2 Model and description

2.1 Description of cylindrical lithium-ion battery

2.2 Battery model: 142-103

3 Conventional indicators

3.1 Nominal capacity 2600mAh (0.2C discharge)

Minimum capacity 2500mAh (0.2C discharge)

The nominal capacity is the capacity value measured when fully charged in the standard charging method and discharged to 2.75V at 0.2C.

3.2 Charging voltage 4.20V±0.03V

3.3 Nominal voltage 3.65V@0.2C

3.4 Standard charging method (25°C ± 2°C) first constant current charging and then constant voltage charging

Current 0.5C (1300mA)

Voltage 4.20V

Termination current 52mA ± 5mA

3.5 Maximum charging current

0°C ≤ T ≤ 5°C 0.1C (260mA)

5°C < T ≤ 15°C 0.2C (520mA)

15°C < T ≤ 45°C 0.5C (1300mA)

3.6 Standard discharge method constant current discharge

Current 0.2C (520mA)

Termination voltage 2.75V

3.7 Maximum discharge current

-20°C ≤ T ≤ 5°C 0.5C (1300mA)

-20°C < T ≤ 45°C 0.2C (1300mA)

45°C < T ≤ 60°C 1.5C (3900mA)
3.8 Cycle life

300 cycles ≥ 80% initial capacity (25°C ± 2°C, 4.2V)

Remarks: Frequent charging and discharging under high temperature and high rate or high voltage conditions will shorten the cycle life of the battery;

3.9 Weight average weight 45g±2g

3.10 Working temperature charging 0°C ~ 45°C discharging -20°C ~ 60°C

3.11 Storage temperature (shipping state) 1 month -20°C ~ 60°C

3 months -20°C ~ 40°C

12 months -20°C ~ 20°C

4 Dimensions

Battery Size: Diameter 18.3mm ± 0.2mm , height 64.9mm ± 0.3 mm . See Appendix 1.

5 Appearance

The appearance of the battery is free from damage to the heat-shrinkable sleeve and obvious scratches, pits, cracks, rust, leakage, etc. that affect the battery performance.

6 Test conditions and definitions

6.1 Test equipment

6.1.1 Voltmeter

Internal resistance >1000Ω/V

6.1.2 Ammeter

Total external impedance (ammeter and circuit) <0.01Ω

6.1.3 Vernier calipers

Vernier caliper accuracy is 0.02mm

6.1.4 Internal resistance tester

At 1kHz carried out to test the resistance at AC conditions

6.2 Except for special requirements, all tests are carried out under the conditions of standard temperature of 25°C ± 2°C and standard humidity of 65% RH ± 20% RH . The battery used in the test is a new battery within one week of delivery.

6.3 Definition

C rate ( “ C ” ): the battery is fully charged . 1 hour discharge current termination magnitude of the voltage to be used ( m A ).
7 Performance

7.1 Charging method

7.1.1 Charge at a constant current of 0.5C to 4.20V, then charge at a constant voltage of 4.20V until the current decays to 0.02C.

7.1.2 Charge at a constant current of 0.5C to 4.20V, then charge at a constant voltage of 4.20V until the current attenuation is 0.05C.

7.2 Discharge method

7.2.1 0.2C constant current discharge to 2.75V.

7.2.2 0.5C constant current discharge to 2.75V.

7.2.3 1.0C constant current discharge to 2.75V.

7.2.4 2.0C constant current discharge to 2.75V.

7.3 Internal resistance

At 25°C, test in 6.1.4 method; battery internal resistance ≤ 65mΩ.

7.4 Rate discharge performance

Charge according to the standard method at 25°C, respectively discharge in 7.2.1 (0.2C), 7.2.2 (0.5C), 7.2.3 (1.0C), 7.2.4 (2.0C), record the battery discharge capacity, and calculate the percentage of the 0.2C discharge capacity of the battery to meet the requirements of Table 1.

<table>
<thead>
<tr>
<th>0.2C</th>
<th>0.5C</th>
<th>1C</th>
<th>2C</th>
</tr>
</thead>
<tbody>
<tr>
<td>100%</td>
<td>≥ 95%</td>
<td>≥ 90%</td>
<td>≥ 80%</td>
</tr>
</tbody>
</table>

7.5 Cycle life

In a test environment of 25°C ± 2°C, charge the battery according to 7.1.2, sleep for 15 minutes, and discharge the battery according to 7.2.2.

Sleep for 15 minutes, charge and discharge once as a cycle, and test the discharge capacity after 300 cycles.

Discharge capacity after 300 cycles ≥ 80% first capacity

7.6 Storage performance

After the battery is charged according to the standard method and stored at 25°C ± 2°C for 28 days, discharge it according to the method 7.2.1 and record the battery capacity.

Battery recovery capacity ≥ 90% of initial capacity.

7.7 Discharge performance at different temperatures

Fully charge according to the standard method at 25°C, discharge according to 7.2.2 after 3 hours at the test
temperature, record the battery discharge capacity at different temperatures, and calculate the percentage of the battery discharge capacity at 25°C, and meet the requirements of Table 2.

Table 2

<table>
<thead>
<tr>
<th>Temperature</th>
<th>25°C</th>
<th>60°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>-10°C</td>
<td>≥ 50%</td>
<td>100%</td>
</tr>
<tr>
<td></td>
<td>≥ 90%</td>
<td></td>
</tr>
</tbody>
</table>

8 Safety performance

8.1 External short circuit test at room temperature

Fully charge the battery according to the standard method. Use an external circuit to short-circuit the positive (+) and negative (-) poles of the battery. The internal resistance of the external circuit is required to be 50mΩ. When the battery voltage drops to 0.1V, or the battery temperature drops to within 10°C of the test temperature, the test ends.

Standard: the battery does not fire or explode

8.2 Overcharge test

After discharging the cell to the final voltage in accordance with 7.2.2, charge it with a current of 1.5C until the voltage reaches 12V. Constant voltage charging makes the current gradually drop. Charging has continued for 7h. During the test, the temperature change of the battery cell is monitored. When the temperature of the battery cell drops to room temperature, the test ends.

Standard: the battery does not fire or explode

8.3 Hot box test

The fully charged battery according to the standard method is placed in a constant temperature heating box, and a thermocouple is connected to the battery to monitor the battery temperature. The temperature rise of the thermostat to heat the battery requires a temperature rise rate of 5°C ± 2°C per minute. Monitor the temperature change of the incubator. When the temperature of the incubator reaches 130°C ± 2°C, keep it at constant temperature for 60 minutes to end the test.

Standard: the battery does not fire or explode

8.4 Over discharge test

Fully charge the battery according to the standard method, and then discharge the battery with a current of 1.0C. The discharge time is 90 minutes.

Standard: The battery does not fire, explode, and does not leak

8.5 Squeeze test

A fully charged battery in a standard way is placed between two horizontal plates, and the length of the battery is required to be parallel to the plate. Use a diameter of 1.25 inch (32mm) piston pump as the power supply hydraulic equipment to continuously pressurize the two plates until the hydraulic pressure reaches 2500psig (17.2MPa), between two flat pressure reaches 3000pounds (13 kN) of compressive force to end the test.
Standard: the battery does not fire or explode

8.6 Drop test

For a fully charged battery in a standard way, the positive and negative terminals of the single battery will drop freely from a height of 1.5m onto the concrete floor and observe for 1 hour. Standard: The battery does not fire, explode, and does not leak

9 Guarantee

Within one year of normal use of the battery, quality problems caused by any manufacturing process and not due to abuse are confirmed to be resolved by the manufacturer. Outside of this period, the battery quality problem caused by customer misuse is not the process reason, Parts Express does not promise to replace it free of charge.

9.1 Parts Express does not assume any responsibility for problems arising from operations that violate safety regulations.

9.2 Parts Express requires batteries not to be used in the field of electric vehicles.

9.3 Parts Express is not responsible for any problems arising from the use of the circuit, battery pack and charger.

9.4 Parts Express does not guarantee the quality of defective batteries produced by customers during the battery assembly process after shipment.

10 Packs

The battery pack contains 100 batteries per box and 2 boxes per box, totaling 200 batteries. See Appendix 2.

11 Other

Any problems not included in this product specification shall be resolved by both parties through negotiation.

12 Transportation

The shipped battery is in a 10% charged state. Due to the self-consumption of the battery, the battery delivered to the client cannot fully guarantee the 10% charge. During transportation, avoid severe vibration, impact, sun and rain.
Appendix 1: Dimensions

* ø18.3±0.2

* 64.9±0.3
Appendix 2 : Packaging Diagram

Cell

Barrier

100pcs per box

Cell Box

adhesive tape

Checked by QA

Total 2Box 200pcs Cell
Safety Guidelines for Round Cells

1 Precautions for charger and battery pack design

1.1 Charging

1.1.1 The battery cell should be charged with constant current charging - constant voltage charging. The charging voltage of a single cell cannot exceed 4.20V, and the charging cut-off current is greater than or equal to 1/20C. Taking into account the control deviation of the charger, it is necessary to ensure that the battery charging voltage is lower than 4.20V. Even in the abnormal case the case, the charging voltage can not exceed 4.23V to avoid overcharging. Charging voltage higher than 4.20V will shorten the cycle life of the battery cell;

1.1.2 The charger should have a pre-charge system, and the pre-charge function should be used to prevent abnormal high-rate charging after deep discharge. When the long-term storage cell voltage is below 2.75V (0% the SOC) must be used when less than 0.26A (0.1C) of the current cell is precharged until the cell voltage is higher than 2.75V then the charging standard manner. If the battery cell voltage cannot be charged to 2.75V within 30 minutes, the charger needs to stop charging;

1.1.3 The charger should be equipped with a complete charging detection device. The charging detection device can detect the fully charged state of the battery through timer, current detection or open circuit voltage detection. When the charging detection device detects that the battery is fully charged, it should completely cut off the charging circuit. Avoid trickle charging;

1.1.4 The battery cell charging should be carried out at the specified current at a temperature of 0°C ~ +45°C. When the battery cell temperature exceeds this range, it should be allowed to stand until the battery temperature reaches the above range before charging.

1.2 Discharge

1.2.1 The discharge current of the single cell must be less than 2C (5200mA);

1.2.2 The discharge termination voltage of the cell must be higher than 2.75V;

1.2.3 The discharge temperature range of the cell is -20°C ~ +60°C. During the discharge process, if the surface temperature of the cell exceeds 70°C, the discharge must be terminated.

1.3 Over discharge

If the voltage of the single battery is lower than 2.75V, the battery is considered to be over-discharged and cannot be used continuously.

1.4 Storage

Cell should be dried (less than 70% RH storage at) environment without corrosive gas, so that the batteries do not withstand any pressure, and can not have a condensate thereof attached to the surface of cell, the optimal storage temperature of -20 deg.] C ~ 20 is deg.] C for long term storage, the batteries must be in charge of 10% ~ 35% SOC state, and the use is required before the voltage detection.

Storage period is less than 1 month: -20°C ~60°C

Storage period is less than 3 months: -20°C ~40°C

Storage period is more than 3 months- 12 months: -20°C ~20°C
1.5 Precautions for battery pack design

1.5.1 The shape, mechanism and material of the battery pack

The battery pack design should ensure that it cannot be charged by unauthorized chargers, and the battery pack design should ensure that it cannot be connected to unauthorized equipment and equipment; the positive and negative ends of the battery pack should be designed to avoid short circuits or occurrence of positive and negative poles. Reverse connection structure; in addition, the battery pack should have an over-current protection device to avoid external short circuits; the positive and negative connection wires of the battery should not overlap; the battery pack design should have anti-static function and can prevent dust. The battery pack should be designed so that even if the battery leaks, the electrolyte cannot reach the protection circuit board; the battery pack design should ensure that the battery is fixed in the battery pack and cannot be moved arbitrarily; the battery pack should be guaranteed in structure. After a foreseeable fall, the battery must not be dented, deformed or other mechanical stress; the materials used in the battery pack such as double-sided tape and rubber should be verified for flammability; the welding mold should be sealed with glue; if the welding mold is sealed Using ultrasonic welding method, Parts Express does not assume any responsibility for any defects.

1.5.2 Battery pack structure (the number of batteries used by the battery pack is limited)

There is no limit to the number of parallel connections, but the battery pack must pass the overcharge test (the charging current of the overcharge test is the product of the maximum charging current of the charger and the number of parallel connections); the number of serial connections is unlimited, and a fuse is required; the battery should be far away from the heating electronic components. The device avoids the deterioration of battery performance; there should be insulation material between the PCBA circuit board and the battery pack for isolation (for example, a plastic barrier provides air isolation or non-conducting electrical material isolation).

1.5.3 Protection circuit

The following protection circuits should be installed in the battery pack:

Overcharge protection. For safety reasons and in order not to shorten the cycle life, the maximum overcharge protection voltage of the single battery in each module should be lower than 4.23V (including tolerance);

Over discharge protection. If the voltage of the single cell reaches 2.75V, we recommend that the over-discharge protection should cut off the discharge current, and the current consumption of the circuit should be as small as possible;

Overcurrent protection. If the discharge current of the single battery exceeds about 5.2A, the overcurrent protection should cut off the discharge current circuit. In order to avoid over-discharge mode in long-term storage, the current consumption of the battery pack protection circuit should be set as small as possible. When it has not been used for a long time, check the remaining power status regularly to ensure that the individual cells in the battery pack cannot reach the over-discharged state.

1.5.4 Battery connection

The battery cannot be connected by soldering. In order to avoid any damage, the battery should be connected to the lead plate by spot welding. The battery pack should be as thermally balanced as possible. When the battery pack is discharged, the internal battery cell temperature difference should be less than or equal to 5°C.

1.6 How to use batteries

1.6.1 When the batteries are used in series and parallel, the same gear, the same batch and the same
charging state must be used. This information can be obtained from the inner and outer box labels. Prior to use of batteries required to detect the voltage resistance, and its use in accordance with the group, at least to ensure that the group of God recommended to use batteries with electrical voltage 20mV or less, the internal resistance difference 6mohm less.

1.6.2 Check the voltage, internal resistance, protection circuit function, thermistor and thermal fuse of the battery pack before shipment.

1.6.3 Pay special attention to prohibiting external force damage during the process of battery transfer to the assembly factory. Parts Express recommends using the same transport packaging during the transfer process, even if the packaging is opened during the process.

1.6.4 Do not use batteries that are damaged or leaking due to transportation damage, drop, short circuit or other reasons.

1.7 Warranty exemption

Parts Express is not responsible for any loss caused by violation of the precautions in the specification;

Parts Express is not responsible for any problems caused by the design defects of battery packs, electric vehicles and chargers; Parts Express does not accept abnormal batteries caused by incorrect assembly process.

2 Safety rules

Batteries contain flammable substances such as organic solvents. Improper use may cause the batteries to generate heat or catch fire, causing damage to the batteries or personal injury. Please pay attention to the prohibited items, and at the same time, add protection devices to avoid battery accidents caused by abnormal use of equipment. Before using lithium ion rechargeable batteries, please read the following safety rules carefully. In addition, Parts Express strongly recommends adding these instructions to the user manual.

2.1 Dangerous matters

2.1.1 Do not use or place the battery cell in a high temperature (above 70°C) environment. Do not throw it into fire, water or make it hygroscopic. Do not repair or disassemble the battery cell, as it may cause the battery cell to catch fire, overheat, leak or explode.

2.1.2 Do not place the batteries in a chaotic manner, and at the same time stay away from conductive materials such as metals to avoid short-circuiting the positive ( + ) and negative ( - ) poles, and do not reverse the positive ( + ) Negative ( - ) pole use.

2.1.3 Do not use non-regulated charging equipment and violate charging requirements. Charging under non-specified conditions may cause overcharging or abnormal chemical reaction of the battery, heat generation, smoke, rupture or fire.

2.1.4 Do not connect the battery to the AC plug (outlet) or car plug. The battery needs a specific charger. If the battery is directly connected to the plug, the battery may catch fire, emit smoke, explode, or cause heat.

2.1.5 Do not overcharge, overdischarge, acupuncture, or hammer the battery cell.

2.1.6 Do not hit or throw the batteries. If the battery cell falls, please dispose of it as a waste and cannot continue to use it.
2.1.7 Do not dissect the battery. If the protection circuit is damaged, the battery will no longer be protected. Then, the battery may catch fire, smoke, explode, or cause heat.

2.1.8 Do not charge near high temperature. If the battery is charged near a high temperature, the battery cannot be recharged due to the action of the protection circuit. In this situation, the protection circuit may be interrupted, and the battery may catch fire, smoke, explode or cause heat.

2.1.9 Do not use batteries that are obviously damaged or deformed. It may cause fever, smoke, cracking or burning.

2.1.10 Do not solder the battery cells directly. Overheating will cause deformation of the battery core components such as insulating gaskets, which may cause the battery core to deform, leak, explode or catch fire.

2.1.11 Do not charge in reverse polarity. During charging, an abnormal chemical reaction occurs when the battery is reversely charged. In addition, an unexpectedly large current may flow during discharge. These may cause heat, smoke, cracking or burning.

2.2 Warning

2.2.1 The battery should be stored away from infants and young children. If the battery is swallowed, seek medical attention immediately.

2.2.2 Do not put the battery in a microwave oven or other cooking utensils. Because microwave heating and electrical shock, the battery may catch fire, take smoke, explode or cause fever.

2.2.3 Do not mix with other batteries. The battery cannot be mixed with other batteries of different capacities, chemical systems, or manufacturers. Do not connect other batteries or mix other batteries. The battery may catch fire, smoke, explode, or cause heat.

2.2.4 Do not use abnormal batteries. If there are obvious abnormalities, such as peculiar smell, heat, deformity or discoloration, please stop using the battery. Such batteries may be defective, and if they continue to be used, they may cause fire, smoke, heat, or explosion.

2.2.5 If the charging process cannot be completed, stop charging. If the battery charging process cannot be completed within a predetermined time, stop the charging step step. The battery may catch fire, smoke, explode, or cause heat.

2.2.6 Do not use leaking batteries near flames. If the battery or the battery with liquid flowing out produces a pungent odor, the battery should be kept away from the flame. The battery may ignite or explode.

2.2.7 Do not touch the leaking battery. If the liquid leaking from the battery enters the eyes, it will cause serious damage. If the leaked fluid gets into your eyes, rinse your eyes with clean water immediately. Please consult a doctor immediately. If the liquid stays in the eyes, it will cause serious damage.

2.2.8 To avoid short circuit or damage, please pack the battery tightly into a box or carton.

2.3 Matters needing attention

2.3.1 Do not use or place the battery in a high-temperature environment, such as in a car under direct sunlight. The battery may catch fire, smoke, explode, or cause heat. At the same time, it may cause deterioration of battery performance and life.

2.3.2 The battery pack has a protection circuit. In places where static electricity (over 100V) is generated, do not use batteries, which may damage the protection circuit. If the battery's protective circuit is damaged, the
battery may catch fire, smoke, explode or cause heat.

2.3.3 The charging temperature range is specified between 0°C -45°C. Do not charge the battery outside the specified temperature range. Otherwise, it may cause heat generation, liquid leakage, or serious damage. In addition, it may cause deterioration of battery performance and life.

2.3.4 Please read the manual before use. Please keep this manual for future reference.

2.3.5 Please read the charging method in the charger manual.

2.3.6 During the first use, if the battery has an abnormal smell, heat or rust, please contact the supplier.

2.3.7 Please stay away from flammable materials during charging and discharging. It may cause fire, smoke, explosion or heat generation.

2.3.8 If the electrolyte leaks from the battery and gets on clothes or skin, rinse immediately with water. Otherwise, it may irritate the skin.

2.3.9 If wires or metal objects come out of the battery, please seal and insulate them completely. Otherwise, the battery may cause a short circuit occurs the fire, smoke, explosions or cause fever.

2.3.10 After use, please recycle the battery according to local laws and regulations.

3 Technical consultation

If you have any questions, please consult the following methods:

Website: www.parts-express.com

For safety reasons, if there are equipment design, lithium ion battery system protection circuit or high current, fast charging and other special applications, please consult Parts Express for related matters.