Product technical standard

Model: IFR32700-6.0Ah

Directory

1. Applicable Scope:

The document describes the specifications of single rechargeable lithium-ion batteries offered by ORBUS NewEnergy Technologies

2. Product Description:

2.1. Description of model definition

Product model: IFR32700-6.0Ah

Battery model description: 32700 cylindrical lithium iron phosphate secondary battery

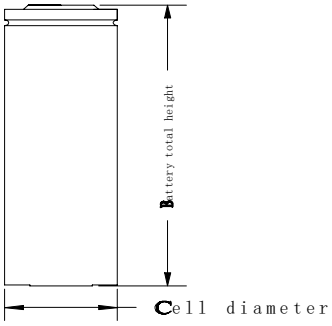
2.2. Standard appearance, code spraying and size:

ORBUS products have standard appearance, spurting code and size. If your company needs to customize the appearance,spurting code and size, please directly communicate with business. If there is no clear requirement for customization, the appearance, spurting code and size should refer to ORBUS standard operation

Battery Standard appearance:

Cylindrical battery, the thickness of the battery outsourcing is 0.1mm thick casing, the color and material can be customized by the customer, the battery according to the code spraying on the casing, distinguish the positive and negative battery.

Standard dimensions of battery :(dimensions include 0.1mm thick casing)



Battery total height	70.5±0.3 mm
Cell diameter	32.2±0.3 mm

2.3. Product standard performance parameters

For battery tests in this specification without explicit instructions, standard charging and discharging method is used in normal temperature environment. Ambient standard of normal temperature: temperature 25±5℃, humidity: 15 ~ 90%RH, air pressure: 86 ~ 106Kpa.The standard charging and discharging mode shall refer to 2.4 in the specification.

Serial number	project	instructions
1	Nominal voltage	3.2 V
2	Charging cutoff voltage	3.65 V
3	Discharge cut-off voltage	2.0V

4	The minimum capacity	6000 mAh / 0.5C discharge
5	Nominal capacity	6000mAh / 0.5C discharge
6	Internal resistance	≤8mΩ (AC 1000 hz, 50% SOC)
7	Shipment voltage	2.6 V ～ 3.4 V
8	Maximum charge ratio	1C
9	Maximum continuous discharge ratio	3C
10	Maximum support discharge ratio	6C 10s
10	Working temperature	Charge: 0°C ~ 60°C Discharge: -20°C ~60°C
11	Storage temperature	Short-term storage at -20℃ ~ 45℃ (< 12 months)
12	The battery weight	140.0±5.0 g

2.4. Standard charging and discharging mode

1	Standard charge	At room temperature, charging is carried out at a constant current rate of 0.2C to 3.65V, and then charging is carried out at a constant voltage of 3.65V to a cut-off current of 0.05c to stop charging Recommended charging time: 3H
2	The standard of discharge	At room temperature, the electric current was continuously discharged to 2.0V at a rate of 0.2C Recommended discharge time: 6H

3. Product reliability

3.1. Cell test conditions:

Use standard charging and discharging methods at room temperature unless otherwise specified

3.2. Test instrument requirements:

Rechargeable equipment: Current accuracy :≤5mA, voltage accuracy :≤5mV

Voltage resistance tester, voltage accuracy of 5 or less mv, the precision of resistance: 0.5 m or less Ω

Temperature tester: Measuring temperature accuracy ≤0.5℃

3.3 Test methods and criteria

The serial number	project	The test conditions	Technical indicators
1	Room temperature discharge capacity	After the normal battery standard is fully charged, set aside for 5 minutes;Discharge 0.5C to 2.0V and repeat for 5 times is allowed. When the range of results of three consecutive experiments is less than 3% of the rated capacity, the test can be finished ahead of schedule and the average of the results of the last three tests can be taken.	≥6000mAh
2	Discharge performance at different temperatures	After the normal battery standard is fully charged, it shall be put in a constant temperature environment of -20℃, -10℃, 0℃, 10℃ and 25℃ for at least 12h, and put in a constant temperature environment of 60℃ for at least 5h, and discharge with 0.2c current to the corresponding termination voltage	Discharge capacity /25℃ capacity *100% - 20 ℃ ≥40%; 10 ℃> 80%; - 10 ℃ ≥ 60%;25 ℃ ≥100%; 0 ℃ ≥70%; 60 ℃≥100%.
3	Different discharge rate at room temperature	After the normal battery standard is fully charged, it is left standing for 10min at the specified ambient temperature. Constant electric discharge of 0.2c, 0.5C, 1C, 2C and 3C is respectively adopted to 2.0V. Battery capacity of different discharge multiples is recorded, and the battery	Discharge capacity/initial capacity *100% 0.2C：≥100% 0.5C：≥100% 1C：≥98% 2C：≥96% 3C：≥92%

		temperature does not exceed 80℃	
4	Room temperature charge maintenance and capacity recovery capacity	After the normal battery is fully charged, open circuit is placed at room temperature for 28 days, and then discharge at 0.5C to 2.0V, recording the remaining capacity, and then test the recovery capacity of the battery according to the charging and discharging standard.	Residual capacity ≥ initial capacity *90% Recovery capacity ≥ initial capacity *95%
5	High temperature charge retention and capacity recovery	After the normal battery is fully charged, open circuit is placed in an environment of 55 ± 2 ℃ for 7 days. After the storage expires, the battery is placed at room temperature for 5h, and then discharged at 0.5C to 2.0V to record the remaining capacity.Then test the recovery capacity of the battery according to the charging and discharging standard.	Residual capacity ≥ initial capacity *90% Recovery capacity ≥ initial capacity *95%
6	Cycle life	Test conditions :(at normal temperature) Charging: 0.5C constant current charging to 3.65V, and then constant voltage charging to current drop to 0.05c Discharge: 1C constant discharge to 2.0V Residual capacity ≥ 70% of initial discharge capacity	2000 times or more

4. Product safety

4.1. Cell test conditions:

Use standard charging and discharging methods at room temperature unless otherwise specified

4.2 Test instrument requirements:

Rechargeable equipment: Current accuracy :≤5mA, voltage accuracy :≤5mV

Voltage resistance tester, voltage accuracy of 5 or less mv, the precision of resistance: 0.5 m or less Ω

Temperature tester: Measuring temperature accuracy ≤0.5℃

The safety test equipment meets the requirements of the test method

4.3 Test Methods and Criteria:

label	project	Test methods and conditions	standard
1	Theoverdischarge	Standard full charge, discharge at 1C for 1.5 hours, and observe for 1 hour	No explosion, no fire, no leakage
2	The overcharge	Standard full charge, charge at 1C to 5.475V or stop charging after charging time reaches 1h, observe for 1h	No explosion, no fire
3	Short circuit test	Standard charge, the monomer battery anode by external short circuit was 10 min, external line resistance should be less than 5 m Ω, observation of 1 h	No explosion, no fire
4	Drop test	Standard full charge, the positive and negative electrodes of the single battery drop freely from a height of 1.5m to the cement floor, and observe for 1h	No fire, no explosion, no leakage
5	The heating test	Standard full charge, the single battery into the temperature of the oven, the oven at a rate of 5℃/min to 130±2℃, and maintain the temperature for 30 minutes, stop heating, observation for 1 hour	No explosion, no fire
6	Extrusion test	When the battery is fully charged, a semi-cylinder with a radius of 75mm is used to press down in the direction perpendicular to the battery pole, with a press speed of 5±1mm/s. When the extrusion reaches 0V or	No explosion, no fire

		the deformation of the battery reaches 30% or the extrusion pressure reaches 200KN, stop the extrusion and observe for 1h	
7	Prick test	Standard charge, use 5mm ~ 8mm high-temperature steel needle at a speed of 25±5mm/s perpendicular to the direction of the battery pole piece. The needle runs through the battery in the geometric center of the puncture surface of the battery, and stays in the battery for 1h	No explosion, no fire
8	Sea water immersion test	Immerse the battery in 3.5% NaCl solution for 2h, and the water depth is required to completely cover the battery. Observe for 1h	No explosion, no fire
9	Temperature cycle test	Standard full charge, the single battery into the temperature box, according to the table below for the temperature cycle, cycle for 5 times, observation for 1h.	No fire, no explosion, no leakage
10	Low pressure test	Standard full charge, the single battery was put into the empty chamber, the test chamber was adjusted to the air pressure of -89.725kPa, stood for 6h at room temperature, and observed for 1h	No fire, no explosion, no leakage

Temperature (℃)	Time increment (min)	cumulative time (min)	Rate of temperature change (℃/min)
25	0	0	0
-40	60	60	13/12
-40	90	150	0
25	60	210	13/12
85	90	300	2/3
85	110	410	0
25	70	480	6/7

Definition of battery explosion: the battery shell is violently broken, accompanied by a violent sound, and the main components (solid matter) are ejected;

Battery fire definition: any part of the battery shall be continuously burnt (lasting longer than 1s). Spark and arc are not combustion

Battery leakage definition: leakage of liquid from the battery to the outside of the battery housing

5. Product packaging and storage

5.1. Product delivery and packaging method:

There are standard packaging methods for The products of ORBUS. If your company needs to change, please communicate with the business. If there is no clear packaging requirements, please refer to the ORBUS standard operation

5.2 Requirements for stacking and storage of products:

Stacking requirements:

According to the shipping packaging mode of ORBUS the stacking layer of battery packaging shall not exceedthe stacking layer of ORBUS single pallet, and the stacking of multiple pallet shall not be allowed.

Storage requirements:

Storage environment requirements: Temperature :25±5℃, humidity :≤60%RH, maximum storage period shall not exceed 12 months

Storage live requirement: If the battery needs to be stored for a long time (one month or more), 50%SOC is required for the battery with power

Storage location requirements:

A) Do not expose the cell to extreme heat or ignition sources

B) Do not place the cell in an extremely cold or condensed liquid environment

C) Do not place the cell in direct sunlight

D) Do not mention that batteries are placed in corrosive gases or liquids

E) Do not immerse the cell in seawater or water, or make it hygroscopic

F) Do not store with COINS and other metal objects. There should be no source of metal debris within 10 meters of the storage location

G) Do not expose the cell to heavy mechanical impact

H) Do not cause obvious damage or deformation to the cell

İ) Place the cell away from children

5.3 Requirements for battery maintenance during storage:

When the battery is stored for a long time, it is required to charge and discharge the battery every three months. The charging and discharging mode refers to the standard charging and discharging mode

6. Other relevant

6.1. Product hazardous Substance control Commitment:

This model of lithium-ion battery meets the company's "environmental material control standards" requirements

6.2. Battery use Warning and other Precautions:

6.2.1. Requirements for battery use:

A) When the cell is connected and used, the same gear, same batch and same charging state cell shall be used.

This information can be obtained from the label of the inner and outer box. Batteries need to be detected before using

voltage variation and according to its USES in equipping, suggest at least ensure equipping use batteries voltage within 6 mv, poor resistance within 6 m Ω.

B) The voltage and internal resistance of the cell shall be tested before use

C) During the transfer of the cell to the assembly plant, special attention should be paid to prevent external damage in the transportation process. It is recommended to use the same transportation packaging in the transportation process

D) Do not use cells that are damaged or leak fluid due to transport damage, drop, short circuit or other causes

F) Do not use a cell near an electrostatic area (higher than 100V)

G) Please read the manual before using the cell, and read and understand if necessary.

H) Please read the user manual to clearly specify the charging mode of the charger.

İ) If rust, peculiar smell or abnormal place is found in the first use of the cell, do not use it, and bring it to the purchase place for processing.

J) When children use the electric cell, they shall be accompanied by their parents and instructed to operate according to the requirements of the user manual.

K) The battery cell should be placed beyond the reach of children. At the same time, it should be noted that children should take the battery cell out of the charger or the product.

L) If the cell fluid comes into contact with the skin or clothes, wash with clean water. It may cause skin inflammation. Seek medical attention immediately.

M) Avoid the performance degradation caused by heating of the battery cell. When using the battery cell, please keep away from the heating parts on the equipment and charger.

6.2.2. Preventive measures for battery pack design

A) Battery pack shape, structure and material

Battery pack shape and structural design is different from other equipment and charger common

The battery pack should be able to avoid short circuit caused by metal, and should have protection and prevention function to overcurrent condition caused by external short circuit

The shape and structure design of the battery pack can avoid the reverse connection between the battery pack and the anode and cathode of the operating equipment

Battery pack shape and structure design can effectively prevent static electricity and water into the battery pack

After the battery pack is assembled, it is required to be able to detect the circuit protection function

The internal structure of the battery pack is required to be designed rationally and no single battery can be extruded

The internal cells should be positioned using the skeleton, tape, glue and other materials to avoid the possibility of leakage, smoke and explosion caused by shock and vibration of the battery pack.But the skeleton and the sharp parts of the mold should not cause damage to the cell (especially the sealing part).

The welding die should be sealed with glue, and the non-welding die should be sealed with ultrasonic welding

B) Protect the circuit to ensure the safety of the battery pack

Overcharge protection can ensure that the charging voltage of the cell is lower than 3.65V/cell. If the charging voltage of the cell is higher than 3.65V, charging will stop

The overdischarge protection can stop discharge with leakage current less than 1 A when the cell voltage reaches 2.50~2.80V/cell

When the discharge current exceeds 11A/cell, the overcurrent protection will stop the discharge

C) circuit

Battery pack circuits are designed with low leakage current (e.g. protection circuit, power monitoring, etc.) to avoid discharging during cell storage

D) Cell connection

Tin welding is not allowed to avoid damage to the cell. Spot welding is used for battery pack assembly to connect wires and circuit boards on the cell. It is recommended that the highest temperature for welding should not exceed 130℃ and the welding time should not exceed 2S

The connection design of the battery pack should take sufficient precautions against short circuit of the battery anode and cathode to avoid short circuit of the battery

6.2.3. Safety rules

The cell contains organic solvent and other flammable substances. Improper use of the cell may cause heat generation or fire, causing damage to the cell or personal injury.Please pay attention to the prohibited items, and at the same time, should add protective devices to avoid abnormal use of equipment caused by cell accidents.Before using lithium-ion rechargeable cells, read the following safety rules carefully

Do not use or place the cell in an extremely hot, Martian environment. Do not put it in fire, water or make it hygroscopic.Do not repair or disassemble the cell. There is a risk of ignition, overheating, leakage, or explosion

Do not place the cell in a mess, and stay away from metal or conductive materials to avoid short circuit of anode and cathode, do not reverse the use of anode and cathode

Do not mix batteries of different manufacturers and different systems. Before mixing batteries of different periods, please consult the after-sales service of ORBUS technology in advance

Do not use non-specified charging devices and violate charging requirements.Non-specified charging conditions will lead to overcharging or abnormal chemical reactions, the production of hot smoke, rupture situation

Do not overcharge, overdischarge, short circuit, prick, hammer or trample the cell

Do not hit or throw the cell, and do not use a cell that is visibly damaged or deformed

Do not dismantle or repair the cell without authorization

Do not connect the cell directly to a socket, charger or other loaded device

Do not place the battery in direct sunlight (or in a car under direct sunlight). Keep the battery away from children to avoid swallowing accidents. If swallowing occurs, seek medical advice immediately

In case of odors release, excessive heat generation or discoloration during the use, charging or storage of the battery cell, remove the battery cell from the device or charger immediately (do not contact the battery cell directly) and stop using it

Do not charge the cell for more than a limited time. If the battery cannot be charged within a limited time, it is necessary to stop charging. If the battery continues to charge, it may generate heat, emit smoke, break or catch fire

Do not place the cell in microwaves or high pressure vessels. Sudden high temperature or damage to the seal may cause the cell to heat, smoke, break or catch fire

Do not solder the cell directly. Overheating will cause deformation of the insulation gasket and other components of the cell, causing deformation, leakage, explosion or fire

Do not contact the drain cell directly or place the drain cell near the fire source

Do not use abnormal cells with damage or electrolyte leakage due to transport collisions, drops, short circuits or other causes

End-of-life batteries shall not be disposed of by the customer and shall be disposed of by a qualified institution

6.2.4. Warranty period

The warranty period of the battery is 18 months after leaving the factory. If the battery is abnormal during this period, it must be due to an obvious manufacturing problem and only if the battery is not being used abnormally will ORBUS replace the battery free of charge.

6.2.5. Technical consultation

www.orbussolar.com

TEK

For safety reasons, if there is equipment design, lithium ion core system protection circuit or high current, rapid charging and other special applications, please first Consult TEKSAN IC VE DIS TIC.LTD.STI. on related matters.