Instruction Manual

For LFP/LCP/LMP Lithium Power Battery

Thunder Sky

Battery Limited

Http://www.thunder-sky.com E-mail : thunder@thunder-sky.com

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Trademark

Thunder Sky®
Lithium Power Battery

- Thanks very much for using Thunder Sky LFP/LCP/LMP lithium power battery.
- Please read the manual before you start to use the battery and kindly keep the manual well for the time you need in the future.

Thunder Sky®
Lithium Power Battery

Instruction Manual

For LFP/LCP/LMP Lithium Power Battery

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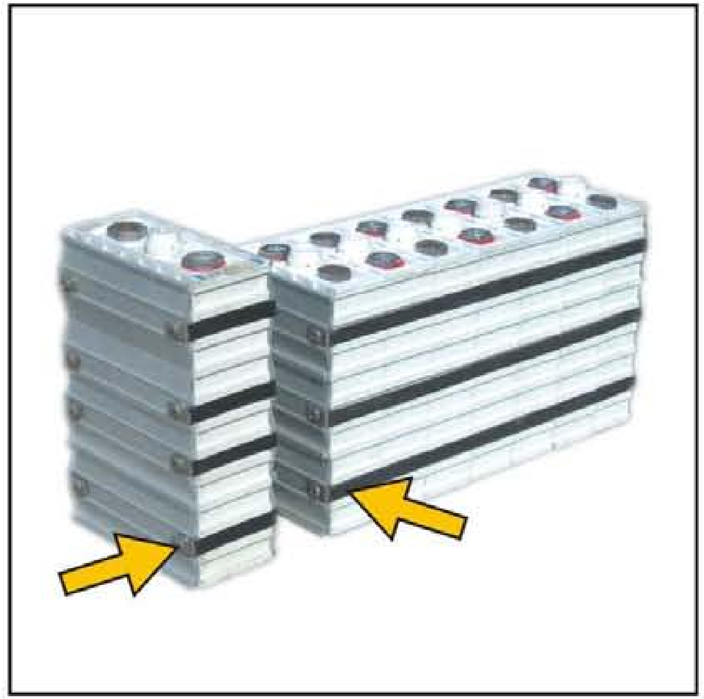
Short Circuit

Discharge the new battery

- Do not make the battery short circuit in any condition
- Do not discharge the new battery, and for first use please charge the battery to full capacity before discharge.

Do not wrest the safety valve of battery in any condition.

Do not vigorously wrest the screw on the terminal



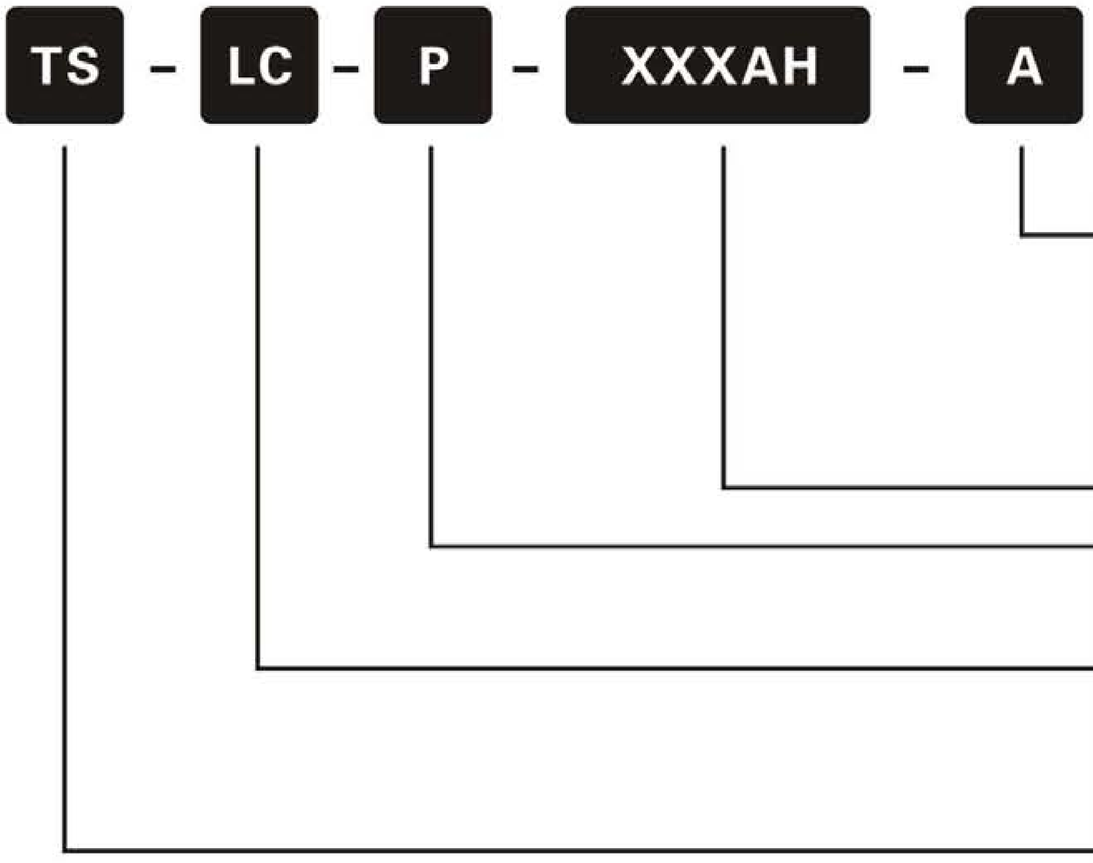
Fix the battery with jig

- Do not wrest the safety valve of battery in any condition
- Do not install the terminal connector with hard power to prevent the damage of terminal screw.
- Fix the cell or battery pack with jig to avoid swelling.

- **After you open the package make sure the goods meet your order requirement.**
- **Check the trademark of Thunder Sky**

Thunder Sky®
Lithium Power Battery

- **Check if the battery damaged during the shipment**
- **Please contact us if there is any defective or inconsistent items with what you ordered.**



"A" means the battery cathode and anode terminal are at same direction.

"B" means the battery cathode and anode terminal are at opposite direction.

"XXXAH" means the nominal capacity of battery.

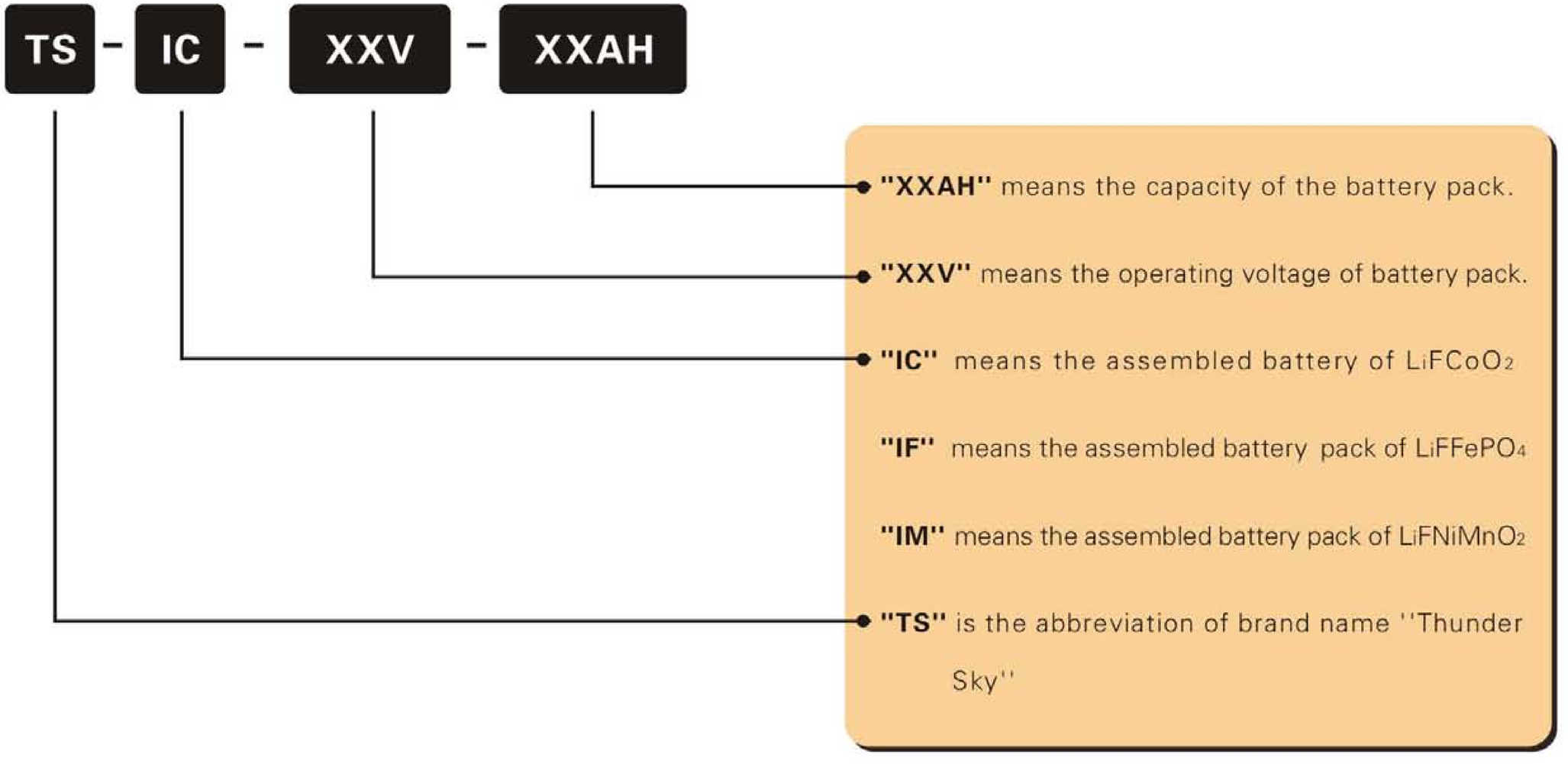
"P" means quadrate form whereas R means cylindrical form.

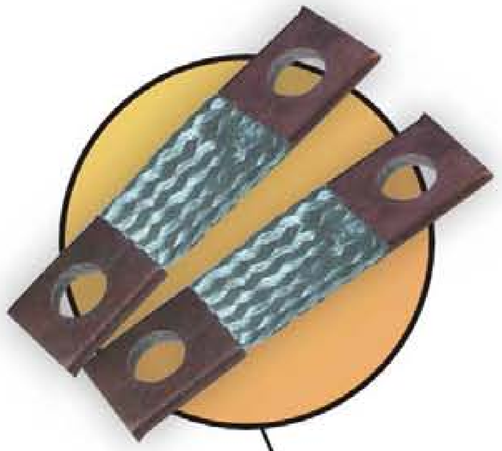
"LC" means the positive pole of $LiFCoO_2$.

"LF" means the positive pole of $LiFFePO_4$.

"LM" means the positive pole of $LiFNiMnO_2$

"TS" is the abbreviation of brand name ''Thunder Sky''.

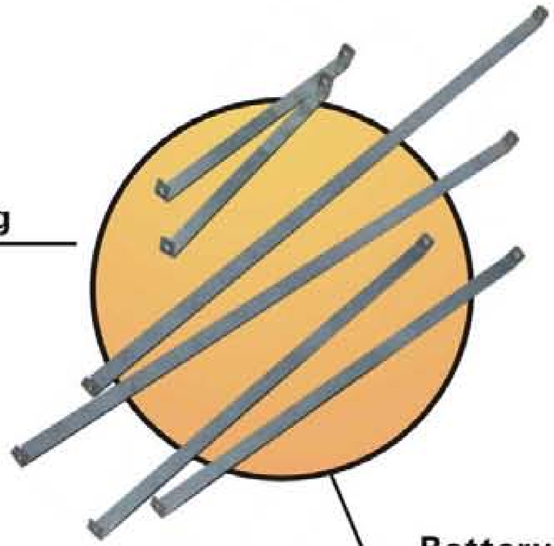

TS - IC - XXV - XXAH
"XXAH" means the capacity of the battery pack.
"XXV" means the operating voltage of battery pack.
"IC" means the assembled battery of LiFCoO2
"IF" means the assembled battery pack of LiFFePO4
"IM" means the assembled battery pack of LiFNiMnO2
"TS" is the abbreviation of brand name ''Thunder Sky''



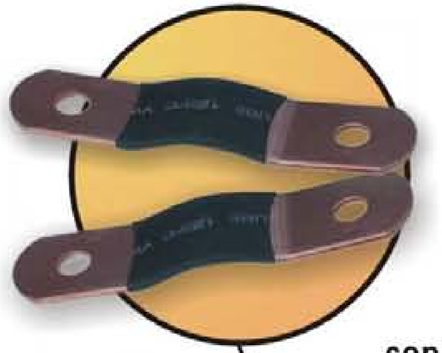
Knitted Terminal connector

stainless bolt, washer and spring ring for the connection of terminal.

Battery pack jig



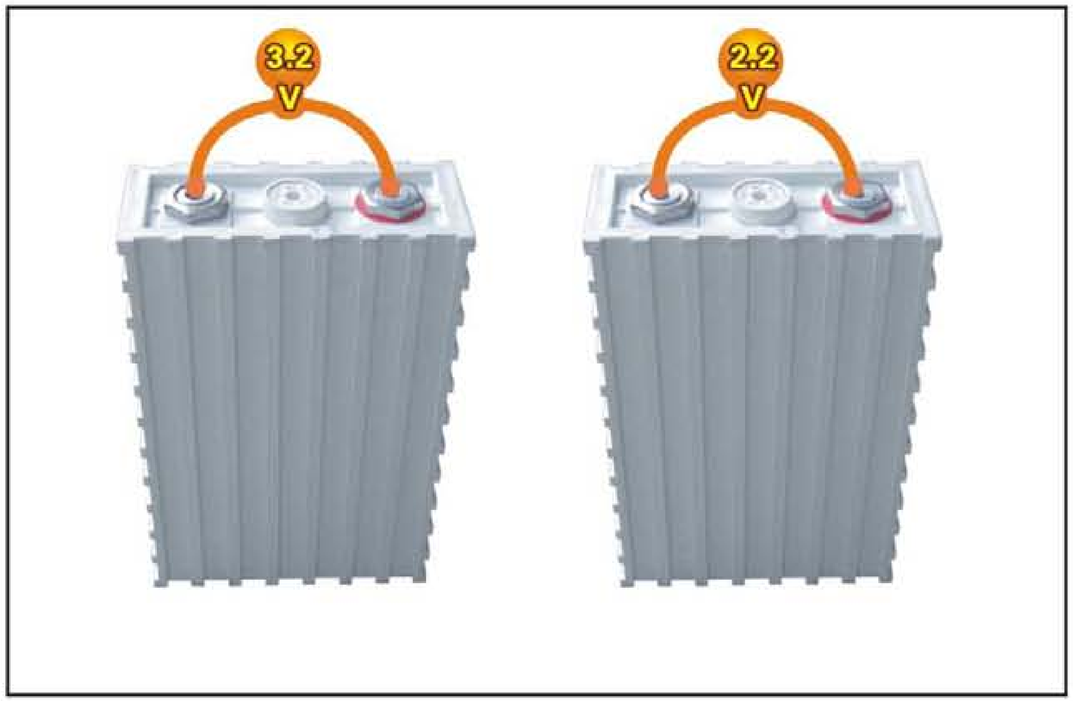
Battery pack Straps



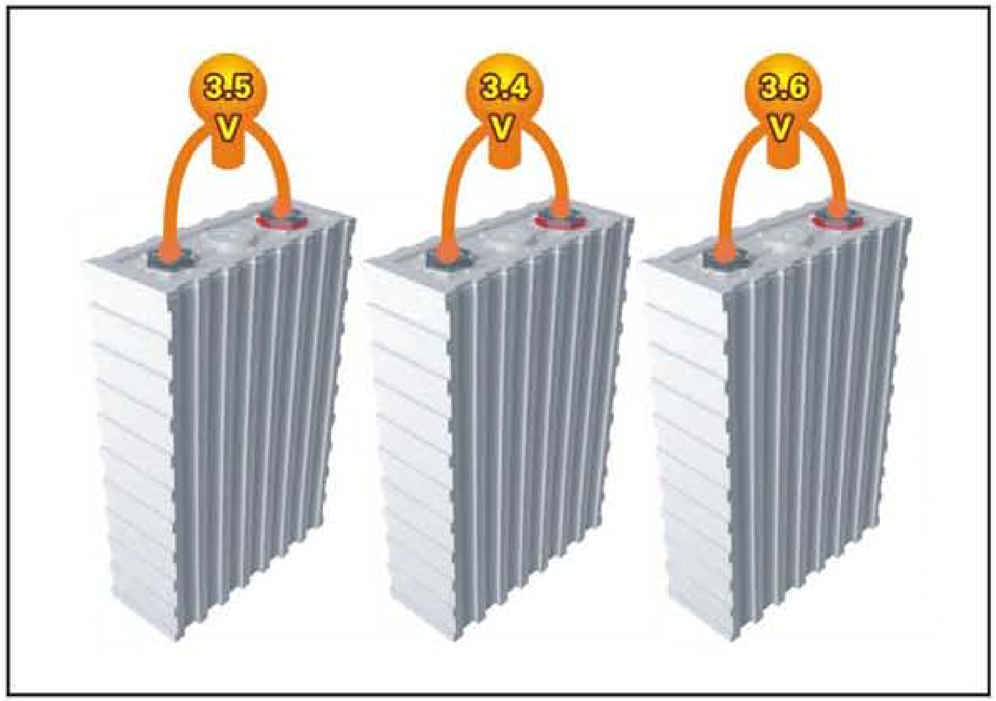
copper terminal connector

● Please check the accessories before use the battery. (The pictures are for reference only, the accessories are subject to its actual features)

A–4 Check The Voltage of single cells

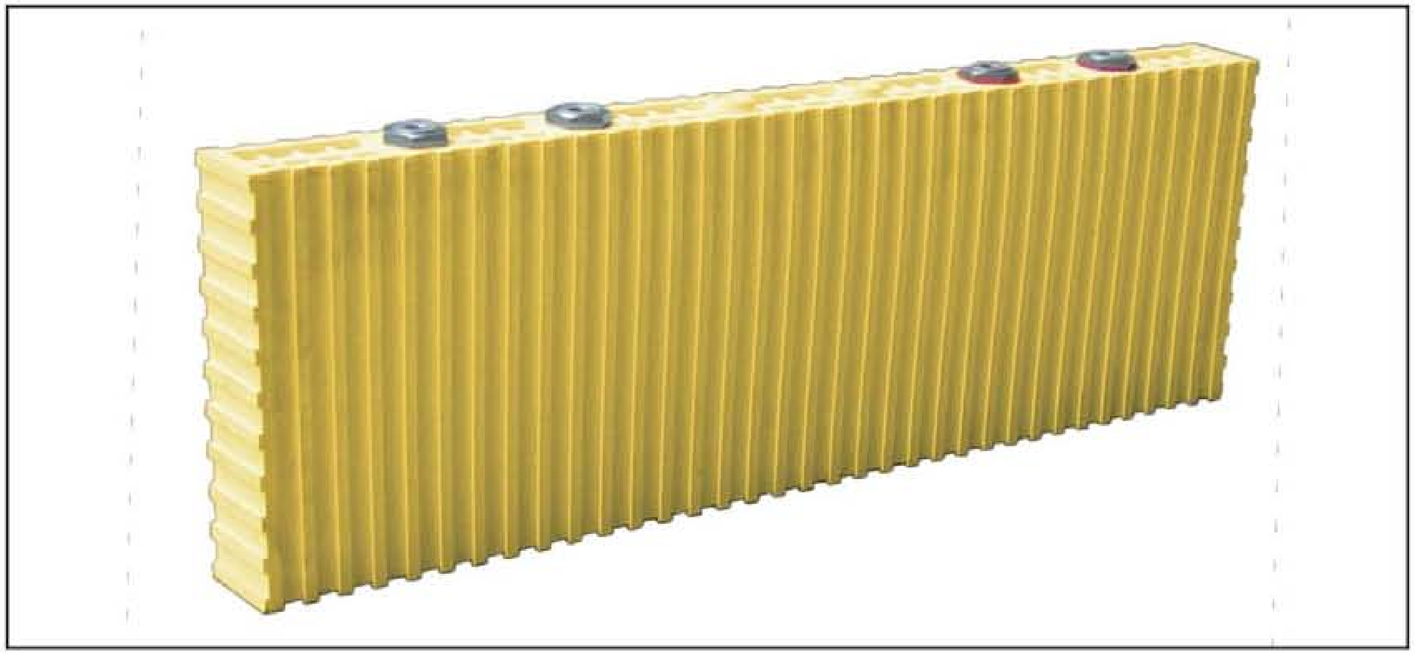


● It is abnormal if any cell voltage is 1 V lower than others.



● Regularly there is 0.1V difference in voltage among all the cells of one pack.

Characteristics of LFP battery



TS–LFP800AHA
Maximum charging current is 2400A (3CA)
Regular charging current is 400A(0.5CA)

TS–LFP90AHA
Maximum charging current is 270A(3CA)

Regular charging current is 40A (approx 0.5CA)

LFP battery is a kind of safe battery, though overcharging or over–discharging may damage the battery it wont cause danger to people. It is only allowed to charge the LFP battery by fast charge mode with current lower than 3CA when the case temperature is not higher than 85℃

LFP battery can be charged by fast–charging mode

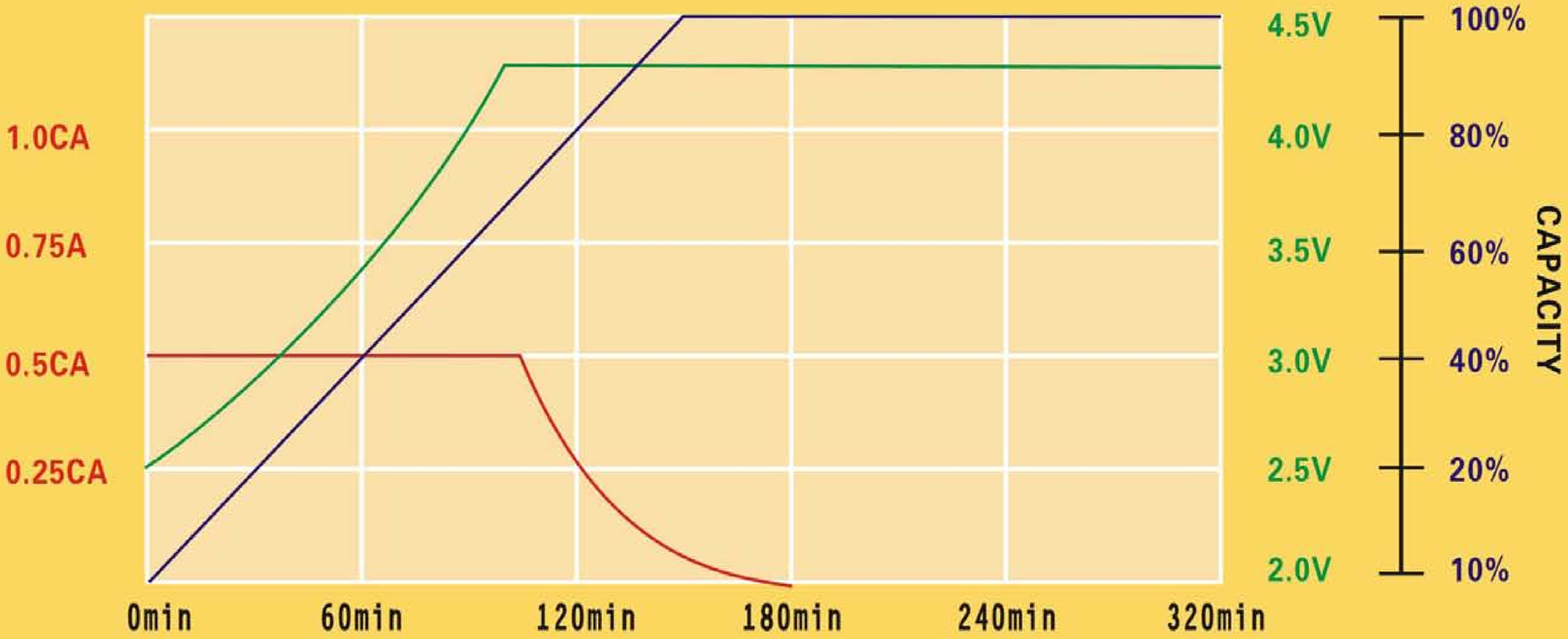


Diagram of optimum charging current for LFP battery

LFP battery can be charged by fast–charging mode and its maximum charging voltage is 4.30V,
The minimum discharging voltage is 2.5V and the optimum charging current is approximately 0.5CA.

A–5 Characteristics Of LFP Battery

■ The discharge voltage of LFP battery can be 2.0V~2.5V,which is not harmful to LFP battery.

■ If keep the charging voltage not higher than 4.3V and discharging voltage not lower than 2.5V at normal temperature , the cycle life of LFP battery should be more than 2000 times.

■ LFP battery will not cause accident when it is overcharged or over–discharged, it wont get fire when circuit short unless the user destroy it on purpose.

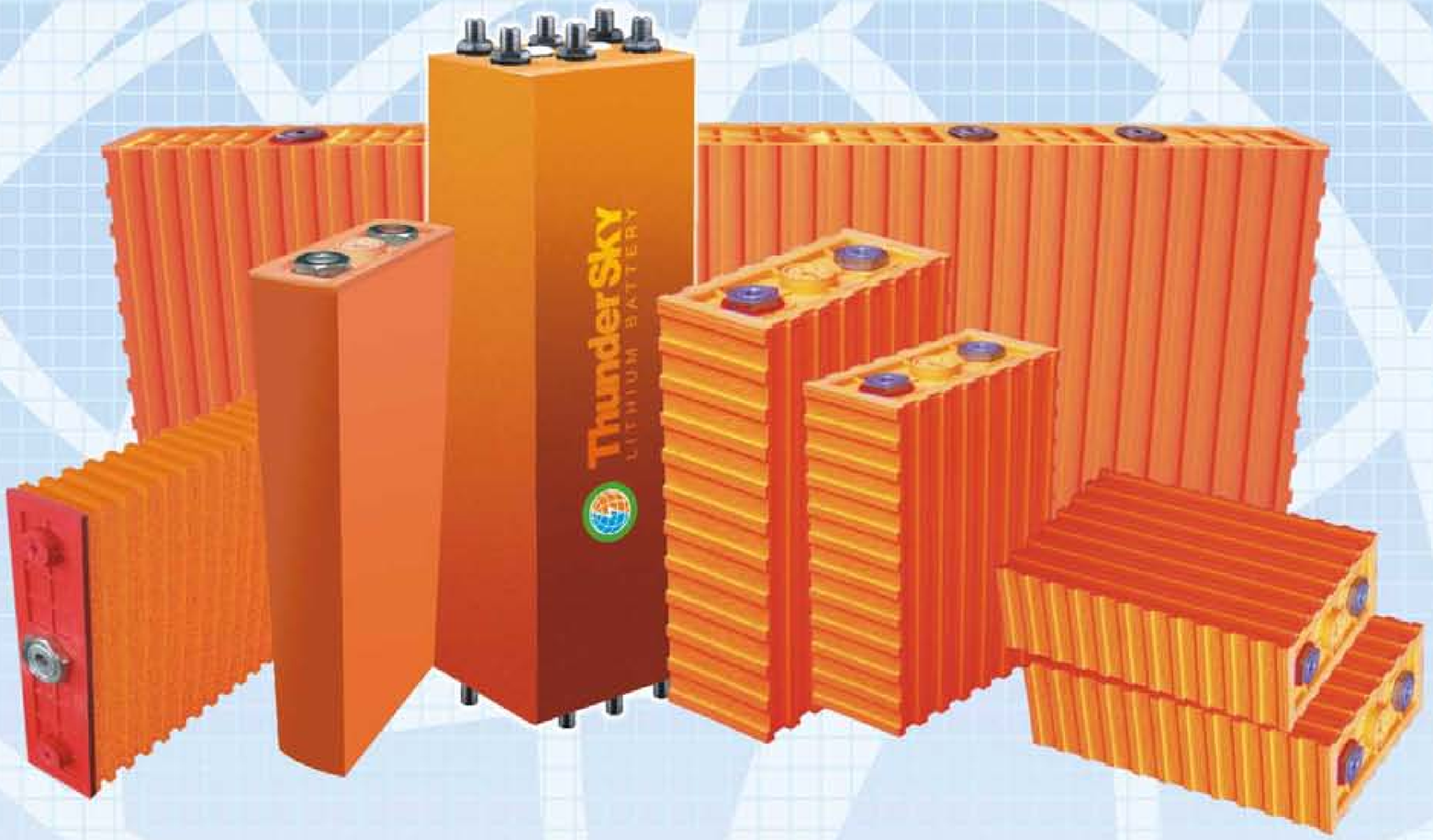
■ LFP battery is an optimum mobile power source.

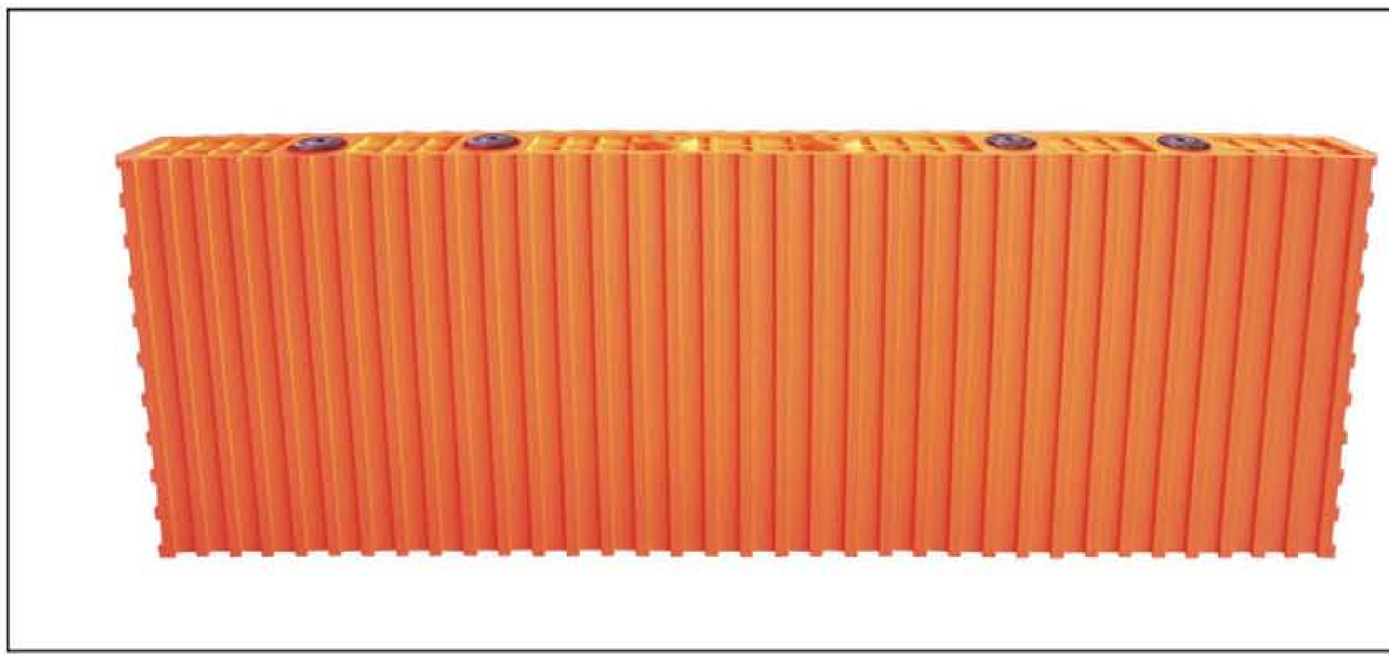
●If assembled LFP battery pack are not used with BMS it will not get fire or burn, however, if this kind of battery has been charged and discharged for long time without BMS, the single cell may be overcharged or over–discharged and even the cell voltage will rise to 5V or 10V, and meanwhile discharge voltage of some cell come down to 1.5V or 0V. At this condition the LFP battery pack will not smoke or burn as LCP battery, however those cells that are damaged by overcharging or over–discharging cannot be used any more. So it is necessary to use BMS with any kind of battery.

●BMS is the best device for battery pack that to balance and protect the cells from overcharging or over –discharging.

Matters Needing Attention Before Using the Battery

Characteristics of LCP battery





TS–LCP1200AHA
Maximum charging current is 600A (0.5CA)
Regular Charging current 400A(Approx 0.3CA)

TS–LCP200AHA
Maximum charging current is 100A (0.5CA)

Regular Charging current is 66 A(Approx 0.3CA)

Characteristics of LCP battery : DO NOT CHARGE LCP BATTERY AT CURRENT OVER THAN 0.5CA, OTHERWISE IT WILL RESULT IN SMOKING AND BURNING.

LCP BATTERY CANNOT BE CHARGED BY BIG CURRENT

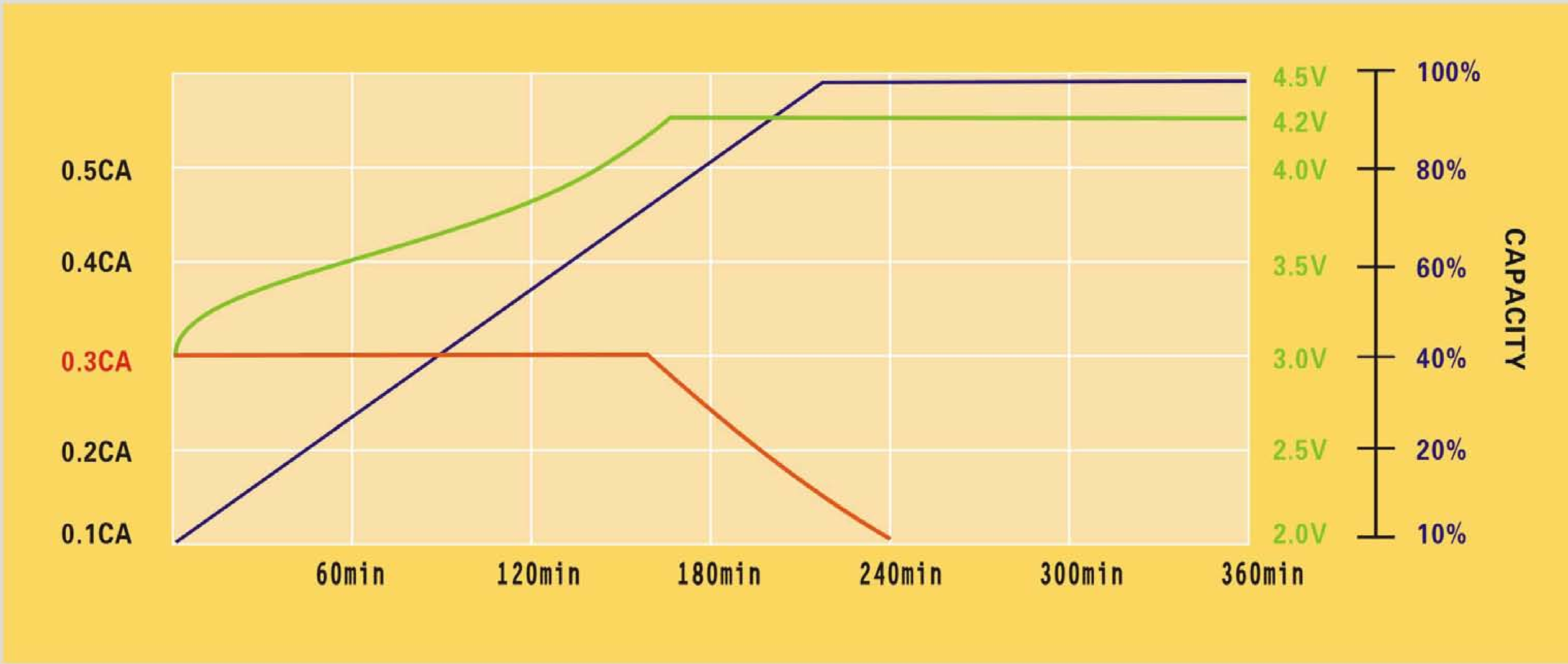


Diagram of Optimum Charging current for LCP battery

It is only allowed to charge LCP battery by current lower than 0.5CA, and the optimum current is lower than 0.3CA;the maximum charging voltage is 4.20V, the minimum discharging voltage is 3.0V.When charge the LCP battery in special temperature please refer to page 30(Diagram 4)

A–6 Characteristics Of LCP Battery

■ If discharge the LCP battery at voltage lower than 3.0V will decrease its cycle life.

■ If keep the charging voltage not higher than 4.2V and discharging voltage not lower than 3.0V at normal temperature , the cycle life of LCP battery should be more than 1500 times.

■ If charge and discharge LCP battery at temperature higher than –30℃ its impedance will increase but will get back to normal when the battery case temperature rise.

■ The temperature will rise accordingly with the current when charge and discharge LCP battery at high temperature lower than 75℃. Regularly, the discharge current will rise while the ambient temperature is high and internal temperature will rise accordingly, which will affect the output power of battery. Please do not discharge the battery for long time at temperature higher than 75℃.

■ The accident happens in following situation:

a. When people over–discharge the battery to 0V and over–charge the battery higher than 4.5V , it will result in internal short and increase the battery self–discharge rate. There will be heat come from internal poles to melt the case and there will be smoke comes out , even burning.

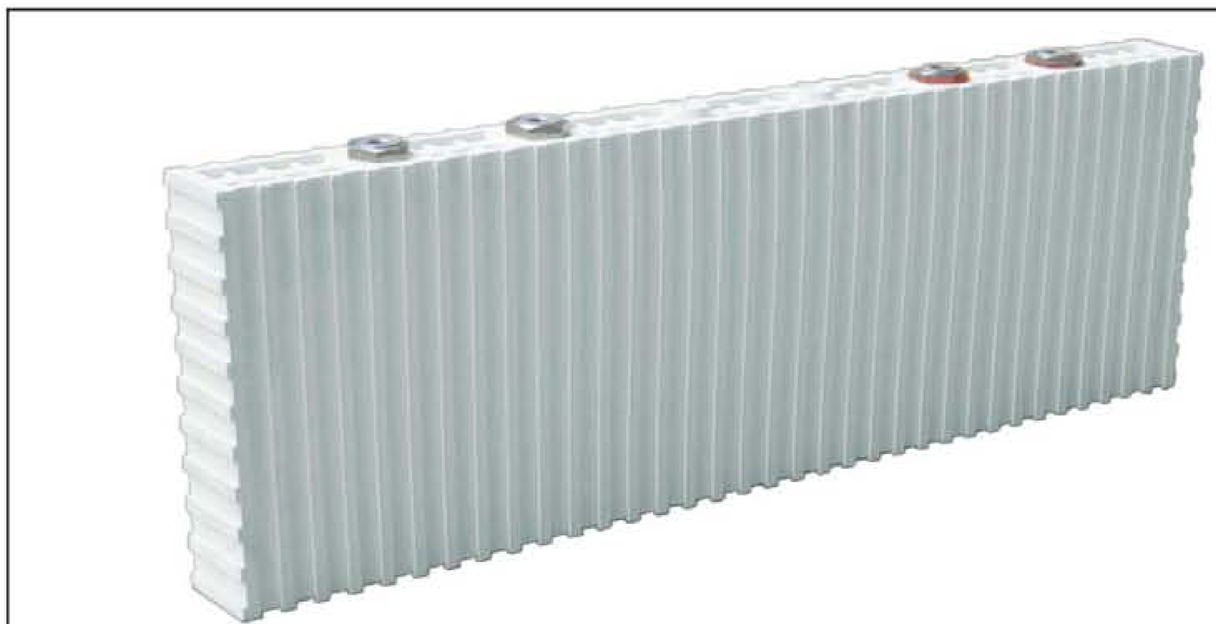
b. If there is no battery management systems used with battery, the cells may be overcharged or over–discharged during the long time use ,which will result in the same accident as above .

C. If people put aside the battery for long time without checking the voltage and charging them, but only discharge the battery once in a while, and then charge them after unmeant over–discharging, which will cause accident as well.

■ Please do use BMS (Battery Management System) to balance and protect the assembled battery packs.

Matters Needing Attention Before Using the Battery

Characteristics of LMP battery



TS–LMP800AHA

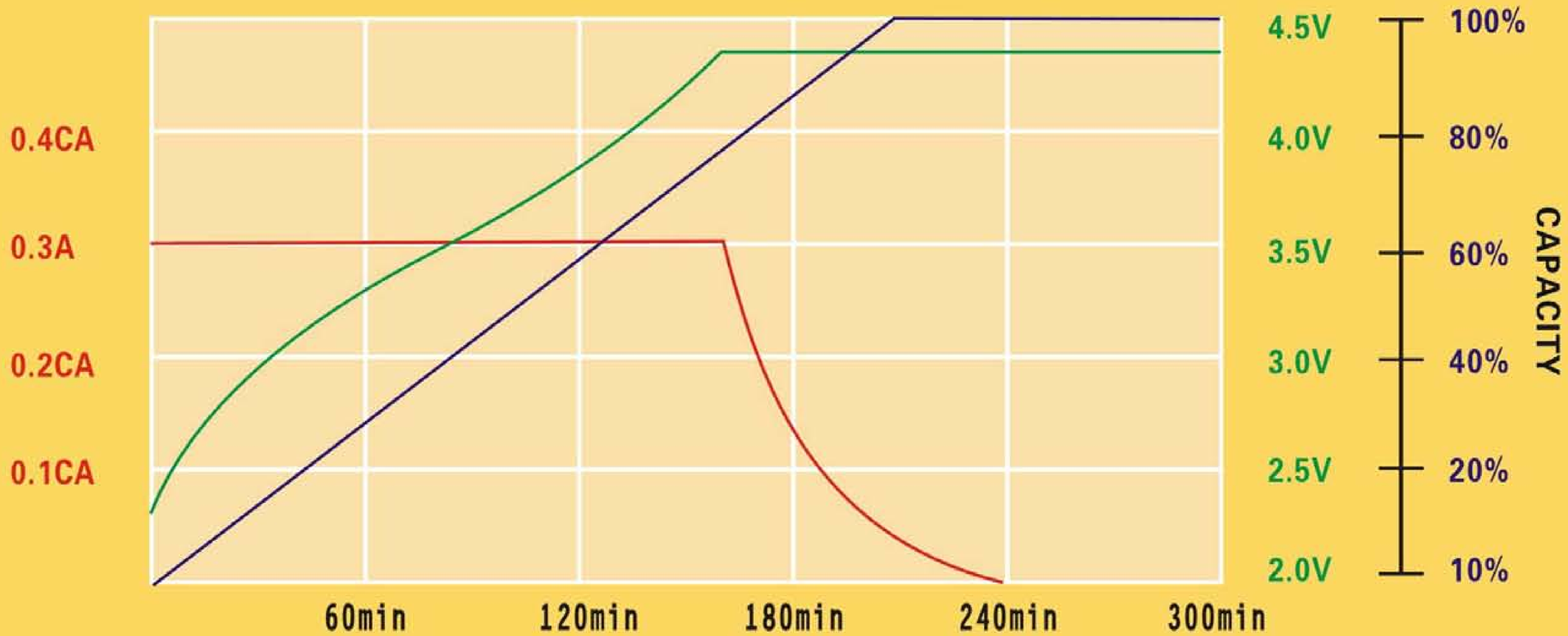
Maximum charging current is 800A(1CA)
Regular charging current is 240A(0.3CA)

TS–LMP90AHA

Maximum charging current is 90A(1CA)

Regular charging current is 30A(Approx 0.3CA)

●LMP battery may smoke or burn when they are overcharged or over–discharged.



LMP battery only can be charged by current lower than 0.5CA and the optimum charging current is lower than 0.3CA; its maximum charging voltage is 4.35V and the minimum discharging voltage is 2.2V.

A－7 Characteristics Of LMP Battery

■ The charging voltage of LMP battery can be 4.3V–4.35V at normal temperature, if keep the charging voltage not higher than 4.35V and discharging voltage not lower than 2.5V, the cycle life of LMP battery should be more than 500 times.

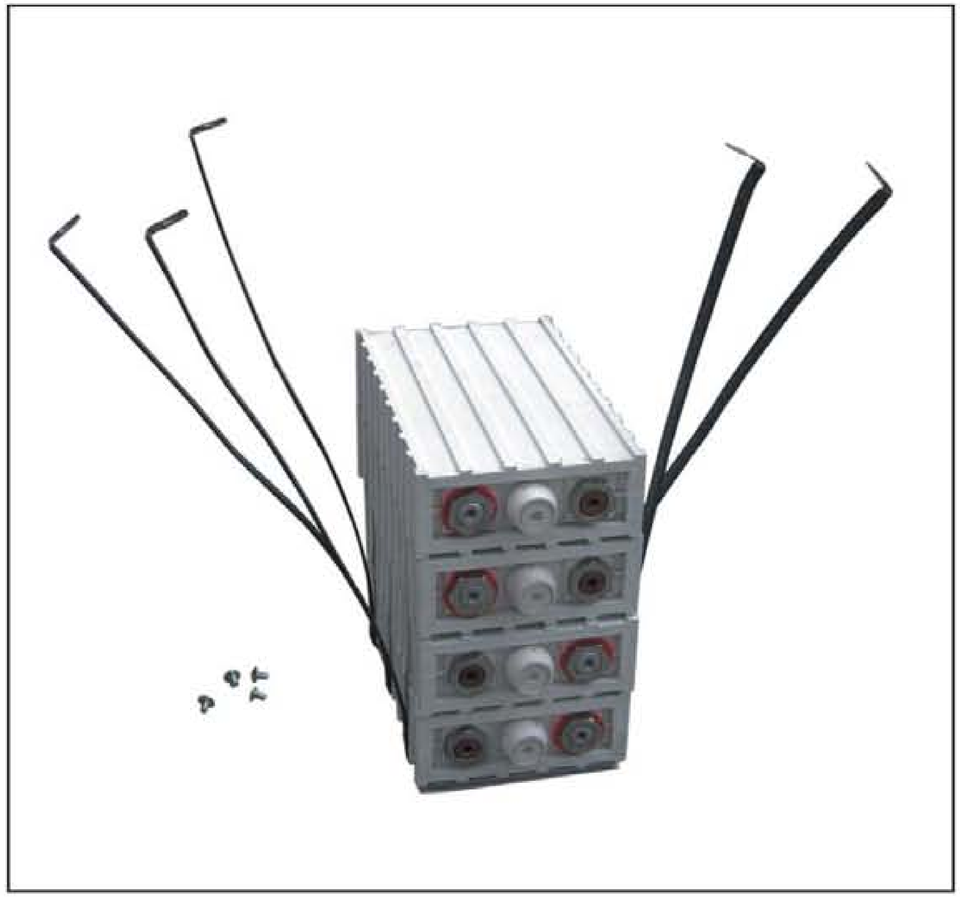
■ LMP battery can be charged and discharged at temperature –30℃~75℃

■ LMP cell with capacity over than 100AH may smoke or burn when internal circuit short caused by overcharging or over–discharging.

■ Assembled LMP battery pack must be used with BMS.

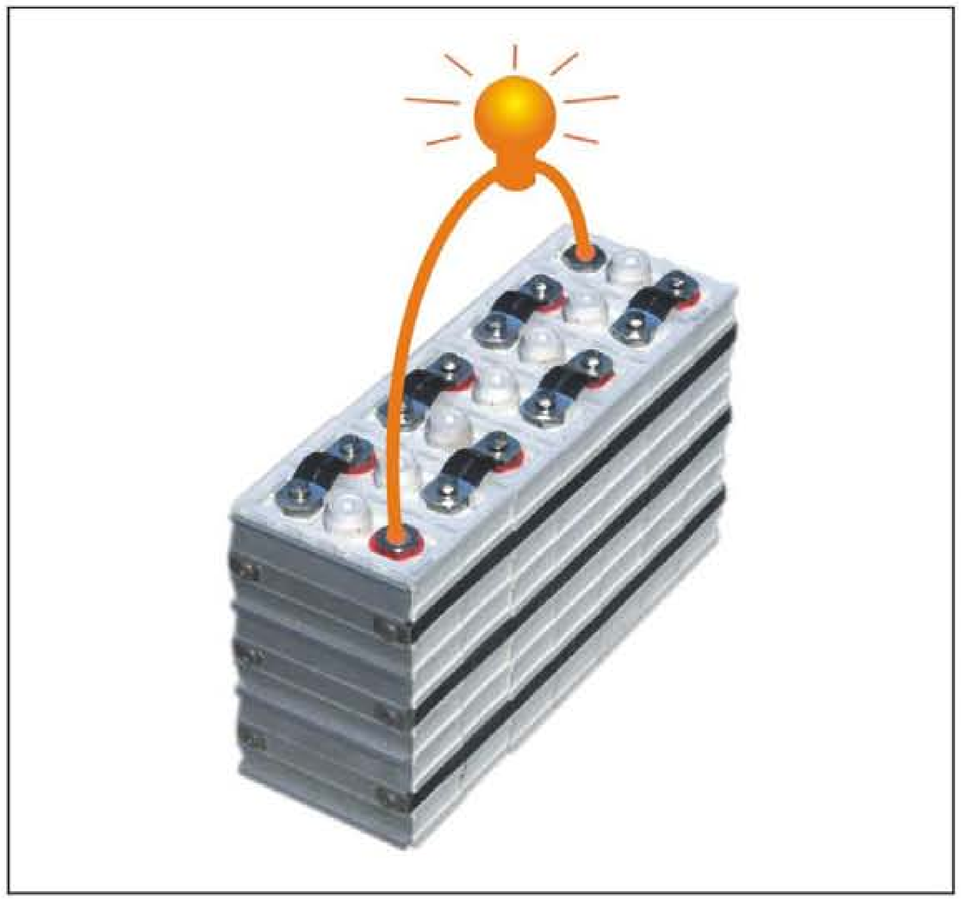
Assemble 7 cells in series as one battery pack

If you want to assemble one battery pack you will have to put cells in series or put them in parallel connection, however the optimum battery systems should be connected in series only which is better for the installation of BMS.



Collocate accessories including straps , bolts and etc.

You will need the accessories such as straps ,bolts or screws to fix the battery when you assemble 14 pieces of cells in series. It is very important to make sure all accessories are fixed whatever battery power you are looking for.



① **Discharge the battery pack**

② **Release the straps and take out the cell you need to replace**

- If you need to replace the single cell of battery pack, please discharge the cells to its standard minimum voltage and replace the cell as above picture , the capacity of new cell should be the same as old one that it replace for.

●Standard Charge and discharge voltage and current of single cells at normal temperature (Diagram 1)

Tempe–rature	Standard / Type	Maximum Charging current	Maximum charging voltage	Maximum discharging current		Minimum discharging voltage
25℃	LCP	0.5CA	4.20V	Constant current	3 CA	3.0V
				Impulse current	10CA	
	LFP	3CA	4.25V	Constant current	3 CA	2.5V
				Impulse current	10CA	
	LMP	1CA	4.35V	Constant current	3 CA	2.2V
				Impulse current	10CA	

●Special charge and discharge voltage and current of single cell at low temperature (Diagram 2)

Tempe-rature	Standard / Type	Maximum Charging current	Maximum charging voltage	Maximum discharging current	Minimum discharging voltage
–35℃	LCP	0.1CA~0.3CA	4.3V	Constant current 1 CA Impulse current 5CA	2.0V
	LFP	0.1CA~1.0CA	4.3V	Constant current 1CA Impulse current 5CA	1.5V
	LMP	0.1CA~0.3CA	4.5V	Constant current 1CA Impulse current 5CA	2.0V

TIP: When the ambient temperature or cell temperature rise all the specification of cell should revert to as diagram 1

● Standard charge and discharge voltage and current of battery pack at normal temperature (Diagram 3)

Tempe-rature	Standard / Type	Maximum Charging current	Maximum charging voltage	Maximum discharging current		Minimum discharging voltage
25℃	LCP	0.5CA	N×4.2V	Constant current	3 CA	N×3.0V
				Impulse current	10CA	
	LFP	3CA	N×4.25V	Constant current	3 CA	N×2.5V
				Impulse current	10CA	
	LMP	1.5CA	N×4.3V	Constant current	3CA	N×2.2V
				Impulse current	10CA	

● **Special charge and discharge voltage and current of battery pack at low temperature. (Diagram 4)**

Tempe–rature	Standard / Type	Maximum Charging current	Maximum charging voltage	Maximum discharging current		Minimum discharging voltage
–35℃	LCP	0.1CA ~0.3CA	N×4.3V	Constant current	1 CA	N×2.0V
				Impulse current	5CA	
	LFP	0.1CA~1CA	N×4.3V	Constant current	1 CA	N×1.5V
				Impulse current	5CA	
	LMP	0.1CA~0.3CA	N×4.5V	Constant current	1CA	N×2.0V
				Impulse current	5CA	

TIP: When the ambient temperature or cell temperature rise all the specification of battery pack should revert to as diagram 3

First Charge and discharge Please do not use the new cells directly because they load half power when they are produced. You need to charge each cell following its charging standard with suited charger.

First Charge and discharge of kinds of battery at normal temperature:

Charge and discharge setup for LFP battery

■ Maximum charging voltage:	4.25V
■ Optimum charging current:	0.3CA
■ Minimum discharging voltage:	2.5V
■ Optimum discharging current:	0.3CA

Charge and discharge setup for LCP battery

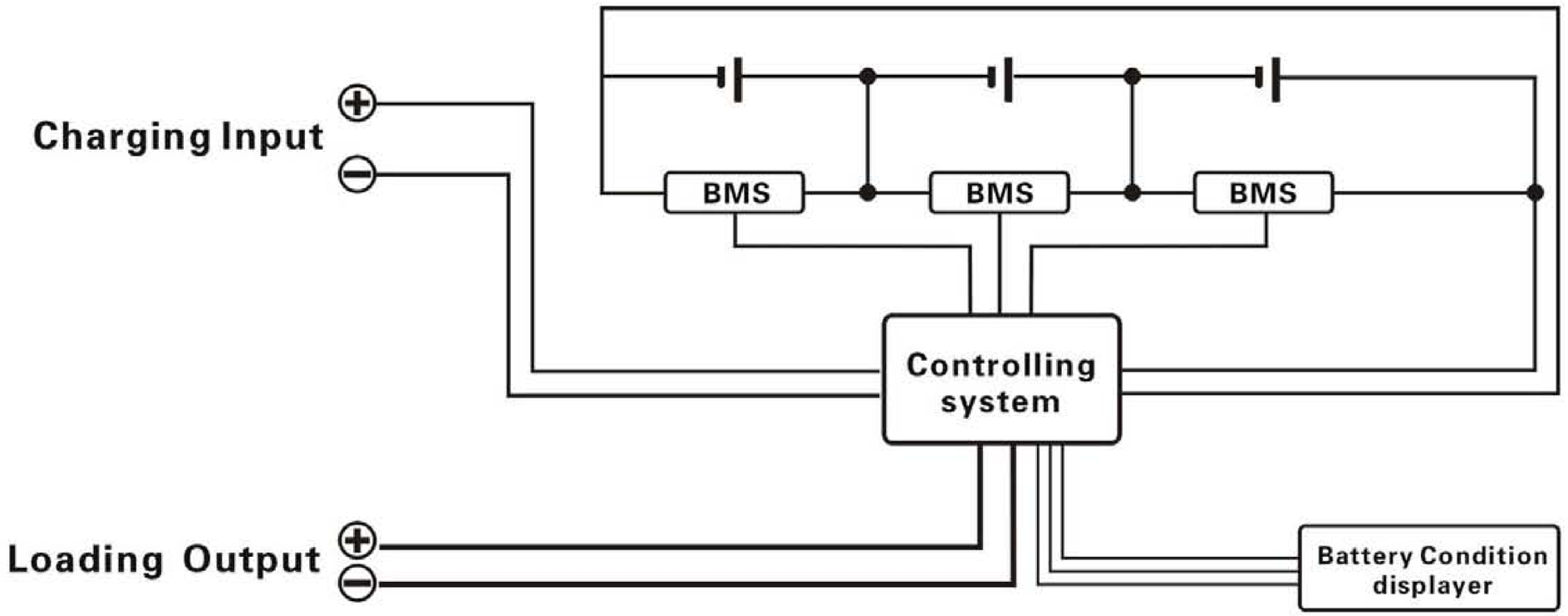
■ Maximum charging voltage:	4.20V
■ Optimum charging current:	0.3CA
■ Minimum discharging voltage:	3.0V
■ Optimum discharging current:	0.3CA

Charge and discharge setup for LMP battery

■ Maximum charging voltage:	4.35V
■ Optimum charging current:	0.3CA
■ Minimum discharging voltage:	2.2V
■ Optimum discharging current:	0.3CA

After first charge and discharge please setup the charging and discharging voltage of different types of battery according its standard

Battery management system (Reference 1)

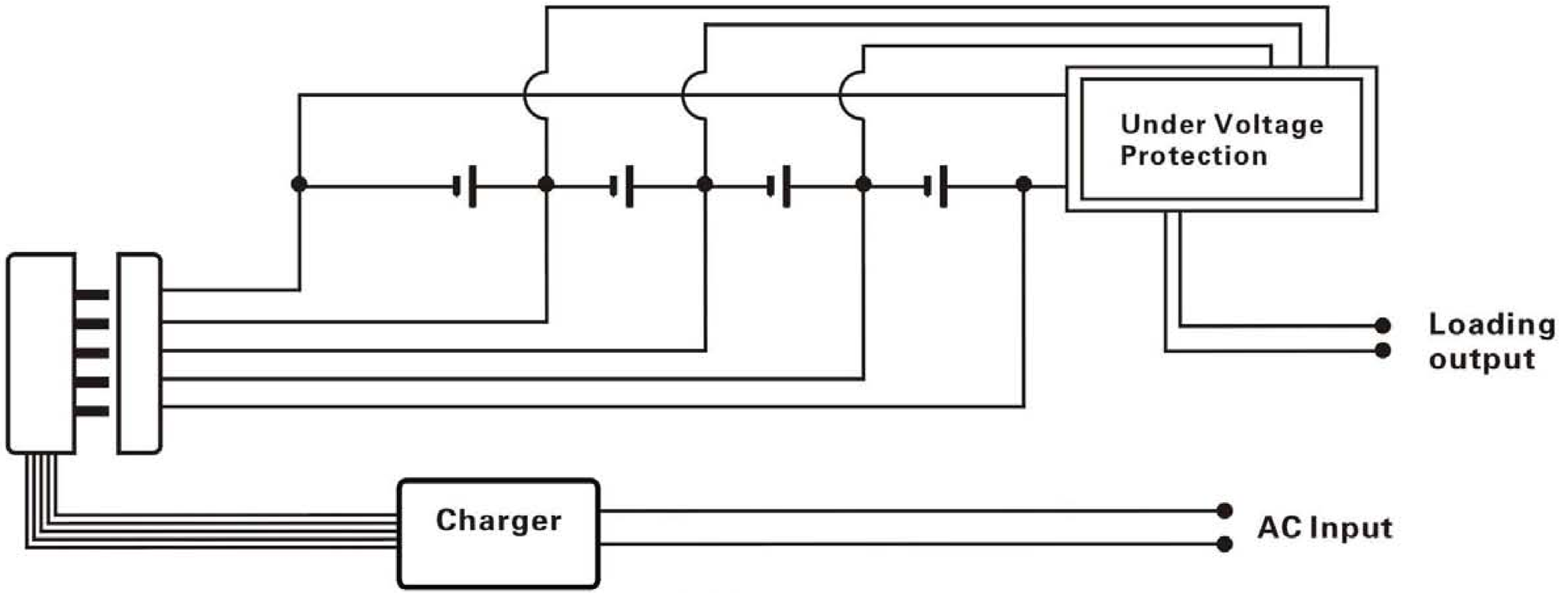


(Diagram 1)

●Regular battery management system

Any storage cell to be used by parallel or in series connection, there must be electronic circuit or monitor circuit installed so as to monitor and prevent the cells from damage caused by overcharging or over–discharging.

Simple balancing charging system for single cells (reference 2)



(**Diagram 2**)

● **Simple balancing charger**

Setup the single charging circuit for single cell as reference 2 which shows the single charging circuit for 4 single cells. Any storage cell to be used by parallel or in series connection, there must be electronic circuit or monitor circuit installed so as to monitor and prevent the cells from damage caused by overcharging or over–discharging. The above diagram is for reference.

The reason that LFP battery can be charged by fast mode is that LFP cathode activity is sintered by mixture of fluorid and thulium and its anode activity is made by nano carbolic fibre and man–made graphite , which can maintain its original molecule structure and endure impact when charged by big current.

- **The maximum charging current for LFP battery is 3CA and LFP battery can be charged to full in 20 minutes by this current.**
- **LFP battery can keep its cycle life of 2000 times when they are charged and discharged by big current for long time.**
- **It is normal that the capacity of LFP battery may increase after charging and discharging cycles.**
- **LFP battery is an ideal mobile power source.**

●LFP battery can be charged by fast mode

■ Repair and Maintenance

Battery is a kind of power storage device , it should be right used and well maintained.

■ Operation and Storage

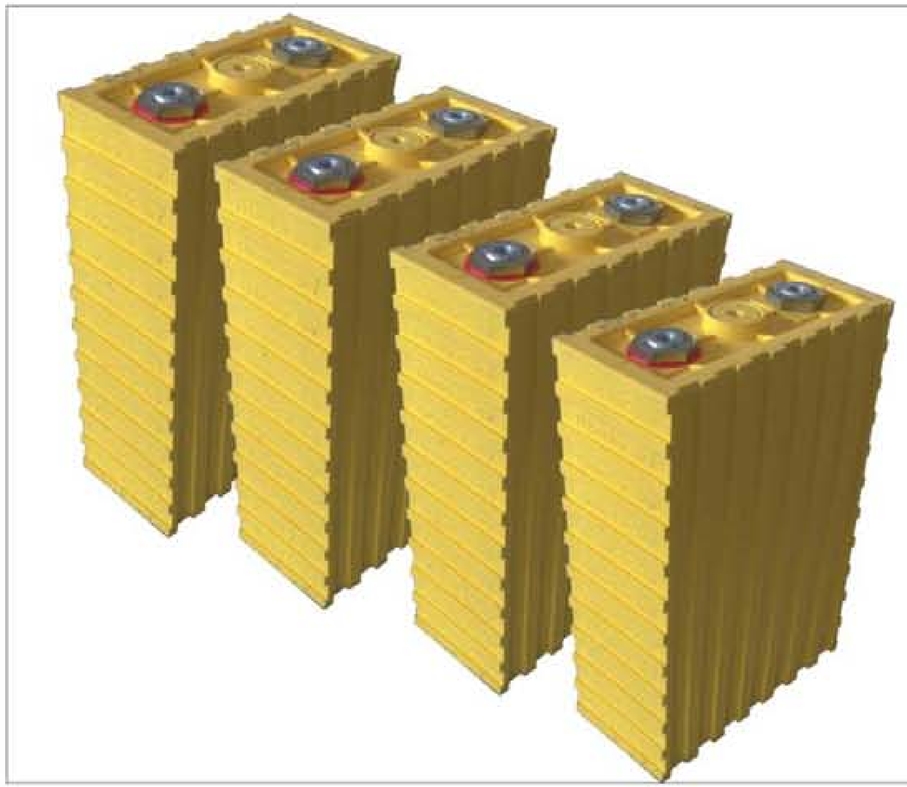
Do not open, destroy or burn the battery as there will be chemical composition released to the air.

Operation

No extrusion or puncture to battery.
Do not connect the cathode (+) and anode (–) by any conductive material(Such as metal)
Do not heat up or joint the battery.
Do not put the battery in the fire.
Do not connect batteries of different types or brands.
Do not connect the old battery with new ones nor connect the battery with different capacity in series or parallel.
The battery can be put in nonconducting container (such as plastic container)

Storage

Please store the battery in cool and breezy place.(The ideal temperature is approx 30℃).If the temperature is higher than 100℃ will cause battery break and leakage.
Keep the battery away from moisture , heat, fire, food or drink.
Please keep the battery some distance away from wall.
Please store the battery at its original package as it will cause case break, burning or leakage if battery get short.
Please charge the battery before putting it for long time storage. Check the battery condition once per month by checking the terminal voltage of each cell to make sure there is no big difference in the voltage of same batch.
Please charge if you find the voltage of any cell is lower than 3.0V.
The regular self–discharging rate is about 3% . Please recharge the battery once per half year.



Cells with same capacity

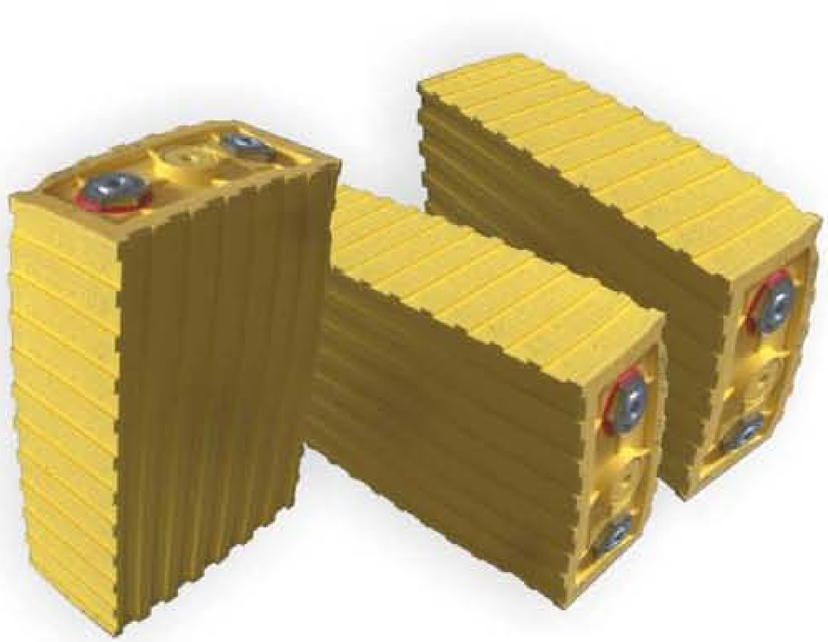
Release the strap and replace the cell with same capacity.

Why the voltage of some cells is 0V?
The impedance of cell may rise during using. If you put any cell of which impedance increased with other cells in series or parallel connection will cause unsaturated charging and over–discharging, which will make the capacity decrease and voltage reduce to 0V.

What to do if the voltage of the cell is 0V among the battery pack?
Discharge the battery pack to its standard minimum voltage and release the straps to replace the cell with new one of same capacity as the above picture.

What to do with swelling?

The battery case is made of plastic (PP) and it will not swell during right use. The battery swelling usually happens when it is overcharged or over–discharged. If it happens,Please replace the swelled one as soon as possible. If you check the impedance, capacity and voltage are normal please use the renewer as the picture shows to make the case back to normal shape.



Swelling Battery

Battery Renewer

What to do with battery case break or terminal and safety valve electrolyte leakage?

There is no danger if the battery case split caused by strong impact or shock during using time, since it happens please completely discharge the battery and replace it.

If the ambient temperature is too high or discharging current is too big, the internal colloid electrolyte will be melt and leak from safety valve, please wipe up by dry duster cloth or absorptive sponge.

Is it normal that the terminal and case give out heat during discharging?

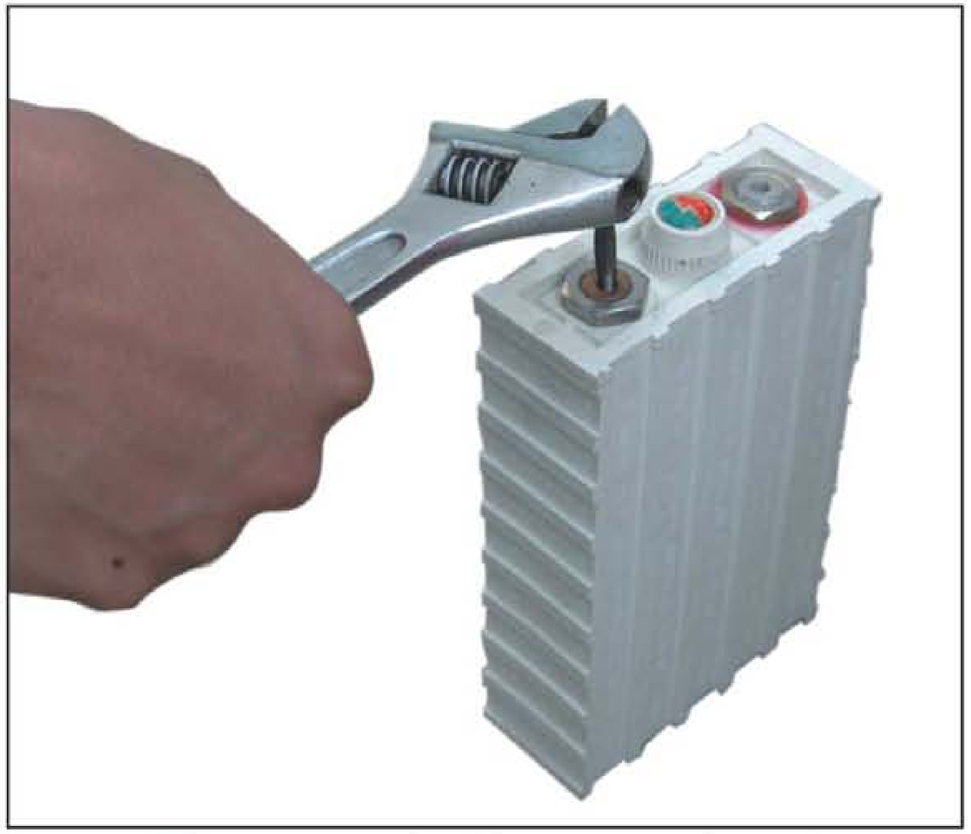
The battery case may give out heat during normal discharging and especially the temperature will rise to 80℃–100℃ if battery is charged and discharged by big current, since it happens please reduce the charging and discharging current until the temperature gets back to normal.

Make sure the case temperature will not be over 110℃ during normal use. Please pay special attention that the case may be melt at temperature of 150℃––250℃.

What to do if the terminal screw thread damaged and become less crowded ?

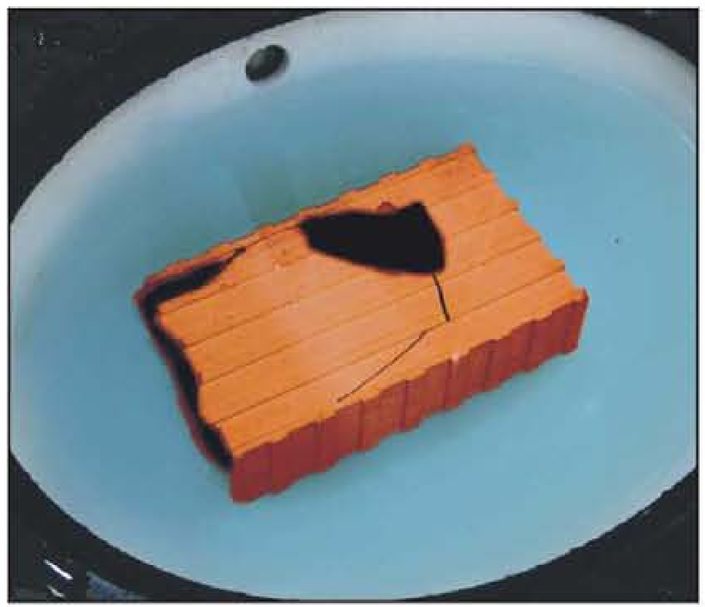
The battery terminal is usually made of Alum. or copper material. If you use too hard power to fix the bolt of terminal connector will cause the thread of screw in the terminal damaged and become less crowded.

Terminal screw thread damaged and become less crowded

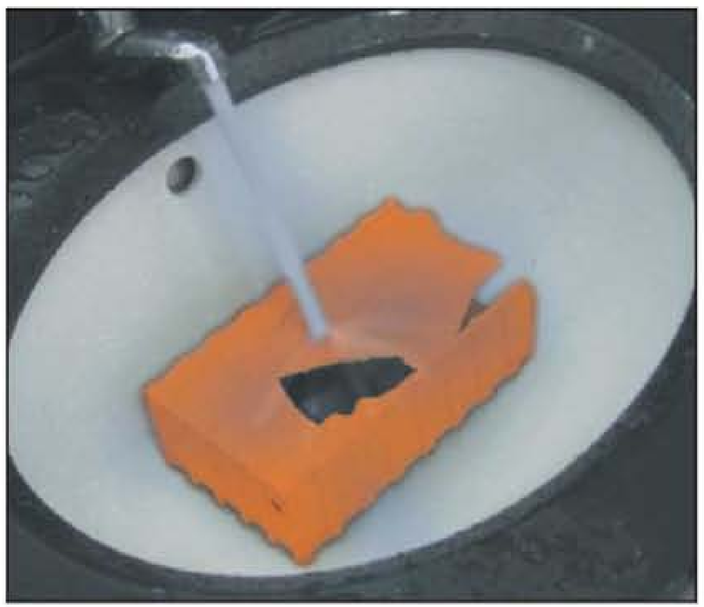


Please remake the screw thread with special tools

uncovered cell

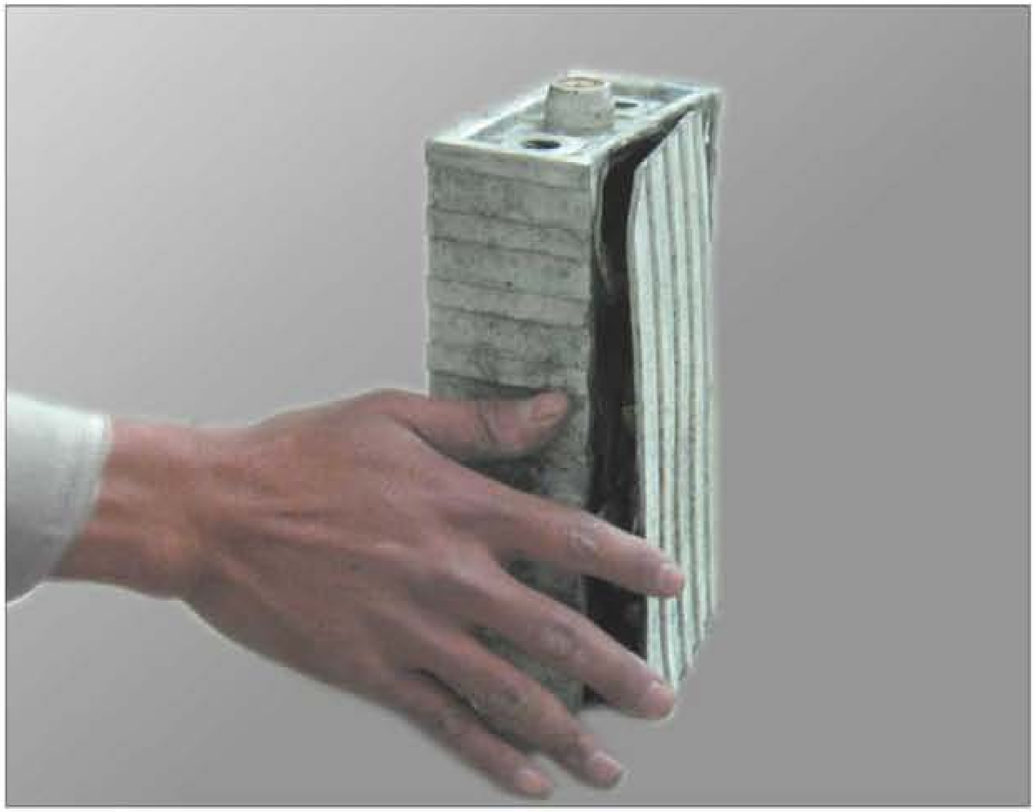


Put the uncovered cell into water



uncovered cell get wringing by water

Note: There is no danger when uncovered cell contact with water.



What to do if contact with skin?

Wash contacted skin with soap and plenty of water.

What to do if contact with skin? Wash contacted skin with soap and plenty of water.

What to do if swallow the battery material incautiously?

It will not cause immediate danger if swallow some battery material incautiously, since this situation happens please make sure the infected person not use emetic and seek medical attention soon.

What to do if battery material contact with eyes?

If the uncovered battery material such as electrolyte or powder hurt your eyes please open your eyes and wash them by plenty of water for at least 15 minutes and seek medical attention soon.

In order to prevent special risks, Thunder Sky kindly advise you :

① Keep the battery out of children's reach.

② Keep away from moisture.

③ Do not get dusty.

④ Do not contact with Skin

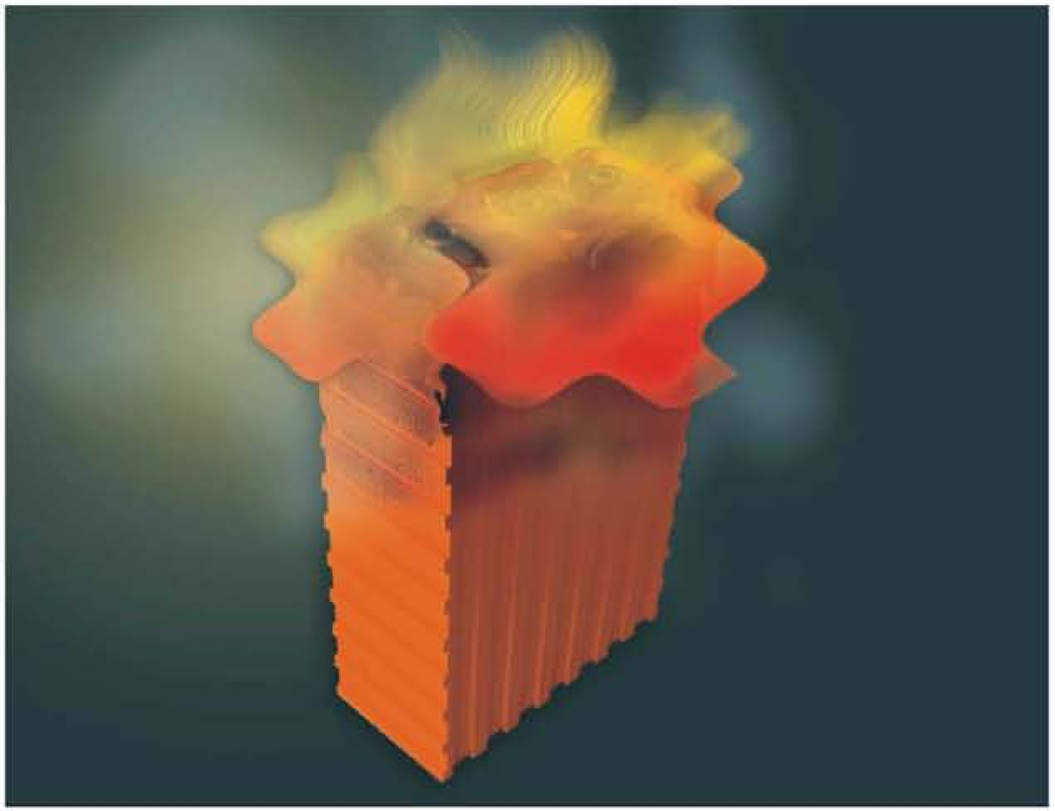
⑤ Put on gloves before operate the battery.

Accident Handle

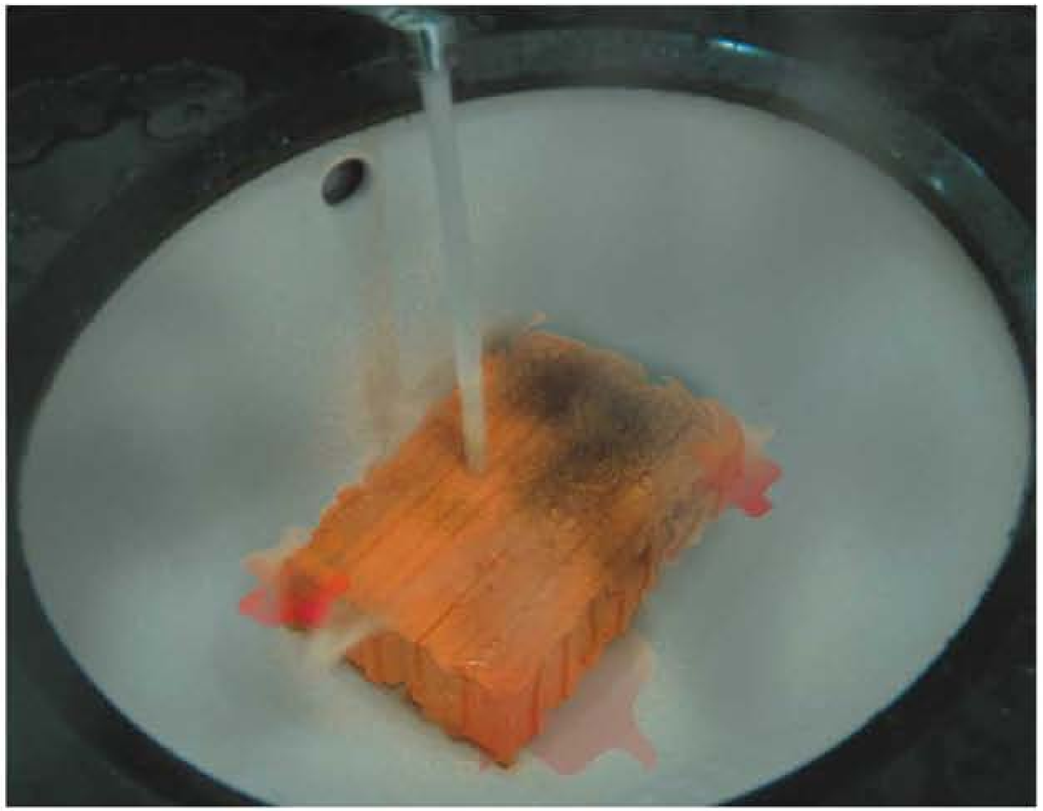
The internal material will leak or get fire only when the battery is misused.

Preferred Help Seeking Means

If the battery break ,smoke or burn please firstly evacuate the people in dangerous area and provide smoke intake ,and put out the fire by water or put the smoking battery into water.



Burning caused by misuse.

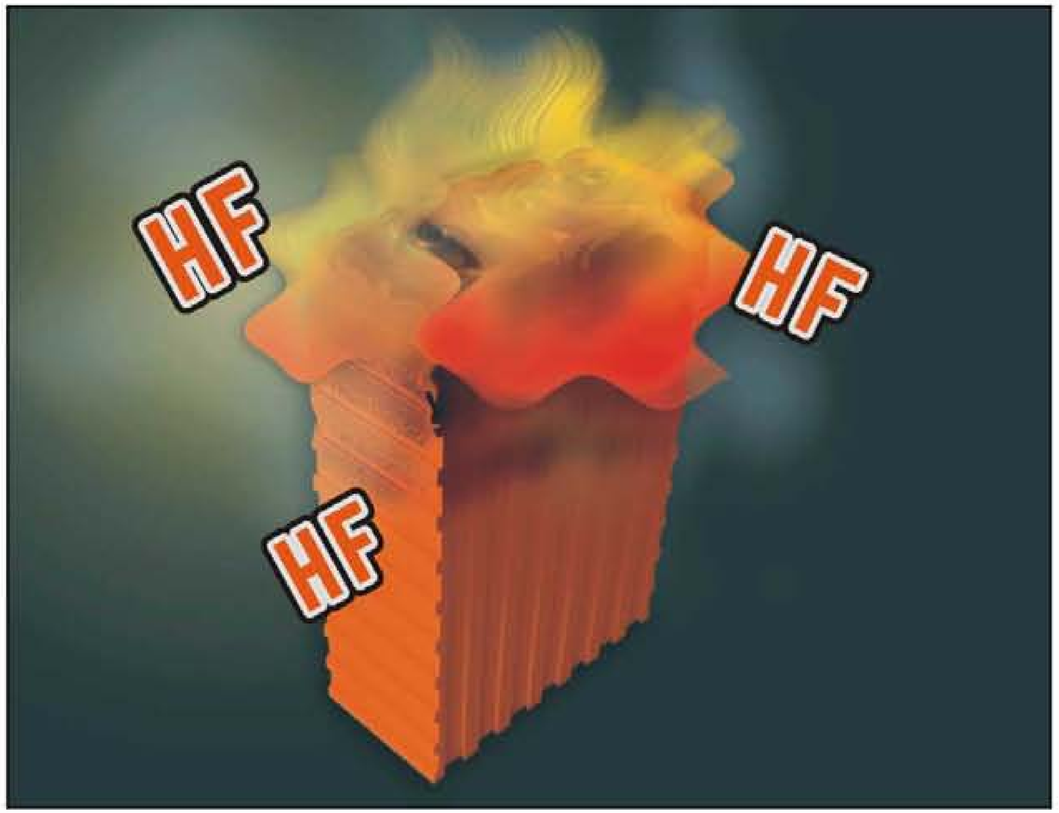


Spray the battery with water or put the smoking or burning battery into water.

Burning and Smoking

If the battery used at temperature of 150℃ or misused by other ways, the internal composition may leak, vaporize or decompose and the flammable electrolytic material will release. While battery burning, there will be fluoride and phosphide coming into being, and if the LiPF6 in the electrolytic material contact with water will produce fluoride and carbon dioxide.

The battery is used at temperature of 150℃ or misused by other ways.



Fluoride and phosphide come into being while battery burning

Extinguishing media

If the battery smoke or get fire the best solution is to spray the smoking or burning battery with water or put them into water.

The alternative solutions are Type D fire extinguisher, CO_2 chemical desiccations or foam fire extinguisher.

Put the battery into water

Type D fire extinguisher, CO_2 chemical desiccations or foam fire extinguisher.

Aerophore

Protection cloths and other protection device

- Please use aerophore to prevent breathing bad air.
- Put on protection cloths or other devices to keep your body away from electrolyte.

Breathing Protection: Not necessary at normal situation . If the battery is broken please use aerophore.

Hands Protection: Not necessary at normal situation. If to handle the leaked battery please put on rubber gloves.

Eyes Protection: Not necessary at normal situation. If to handle the leaked battery please put on protection glass.

Skin Protection: Not necessary at normal situation. If to handle the leaked battery please put on rubber apron.


CTS

CENTRE OF TESTING SERVICE
OPERATE ACCORDING TO ISO/IEC 17025

DECLARATION OF CONFORMITY

EC DECLARATION OF CONFORMITY

LITHIUM ION BATTERY

Model No.: TS-LFP-LCP-LMP Brand Name : THUNDER SKY

EN 61960－2 / 2001，EN 61000-4-2

THUNDER SKY BATTERY LIMITED
LISHONGLANG NO. 3 INDUSTRY ZONE, GONGMING TOWN,
BAOAN DIST., SHENZHEN, P.R.C

CE

MANUFACTURER / IMPORTER

TEST LABORATORY

CE Certificate


DAS Certification

QUALITY MANAGEMENT SYSTEM
Certificate of Approval

Thunder Sky Battery Limited

Thunder Sky Green Power Source (Shenzhen) Co., Ltd.

ISO9001:2000

Certificate Number Q31051030

DAS CERTIFICATION LTD.

ISO 9001 certificate
(English Version)


DAS Certification

质量管理体系认证证书

深圳市雷天电源技术有限公司
雷天绿色电动源（深圳）有限公司

ISO9001:2000

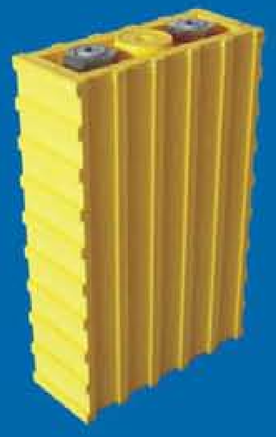
锂离子动力电池的设计制造及服务

Q31051030

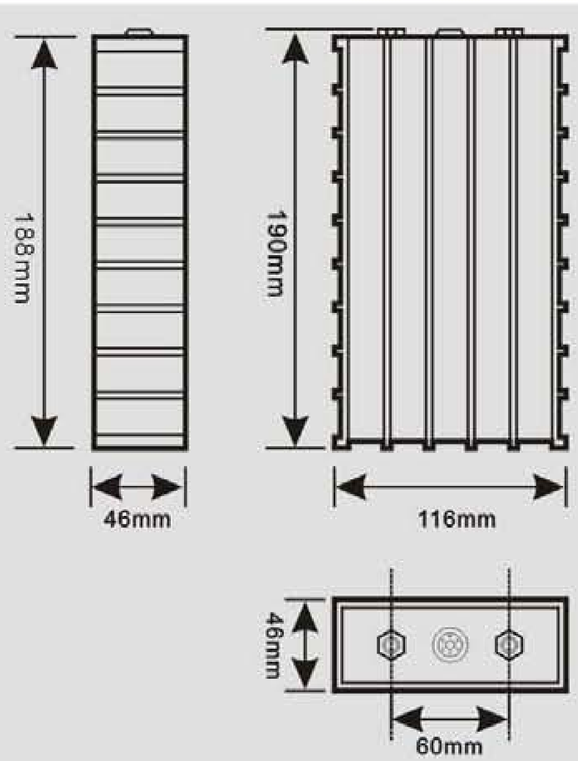
DAS CERTIFICATION LTD.

ISO 9001 certificate
(Chinese Version)

DIMENSIONS

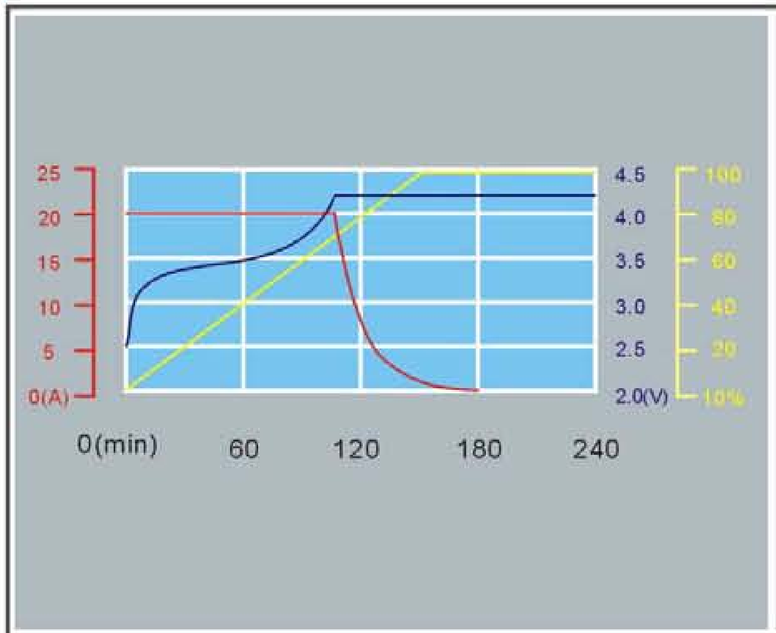


MODEL: TS–LFP40AHA

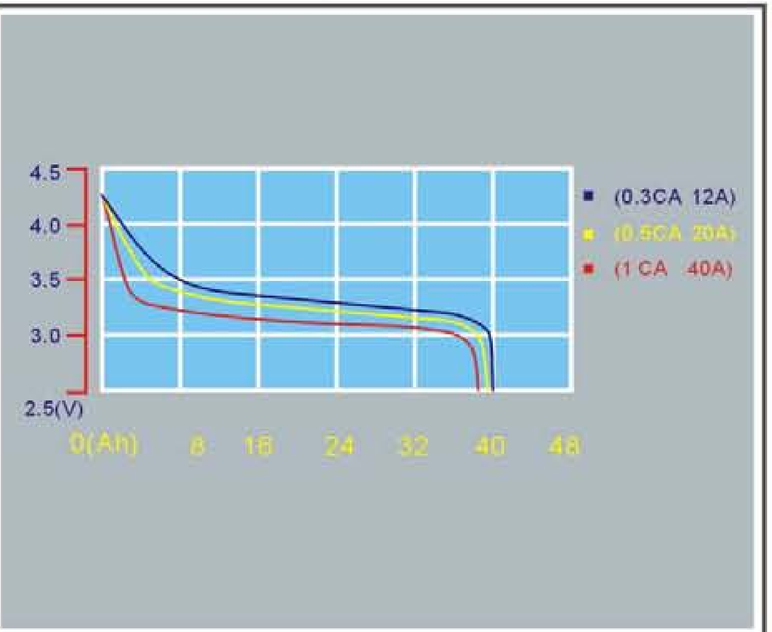


MODEL: TS–LFP40AHA

Nominal capacity	40AH	Operation Voltage	Charge: 4.25V
			Discharge: 2.5V
Max Charge Current	≤3CA	Max Discharge Current	Constant Current ≤ 3CA
			Impulse Current ≤ 10CA
Standard Charge/ Discharge Current	0.3CA	Cycle Life	(80DOD%) ≥2000Times
			(70DOD%) ≥3000Times
Temperature Durability Of Case	≤250℃	Operating Temperature	Charge: –25℃~75℃
			Discharge: –25℃~75℃
Self–discharge Rate	≤3%	Weight	1.6kg ± 100g

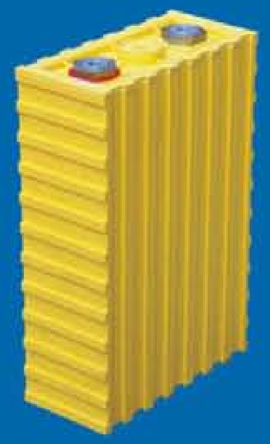


TS–LFP40AHA CHARGE AT TEMPERATURE OF 25℃

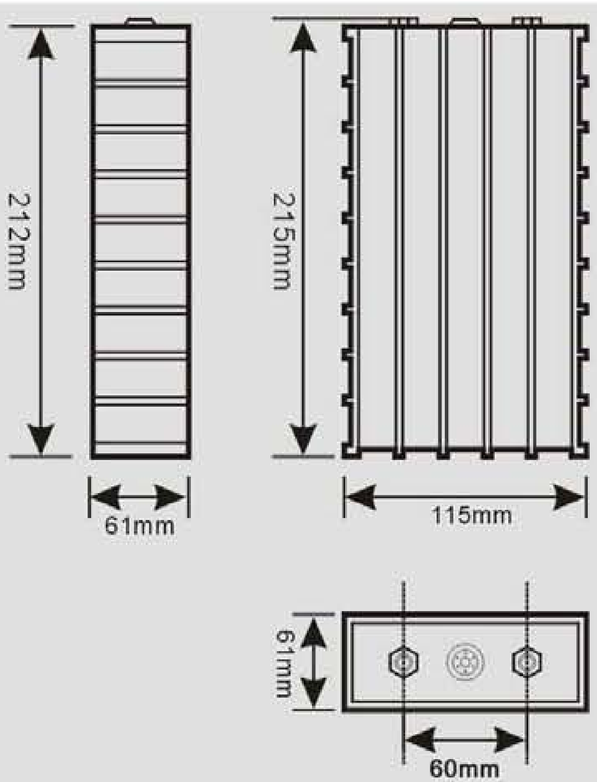


TS–LFP40AHA DISCHARGE AT TEMPERATURE OF 25℃

DIMENSIONS

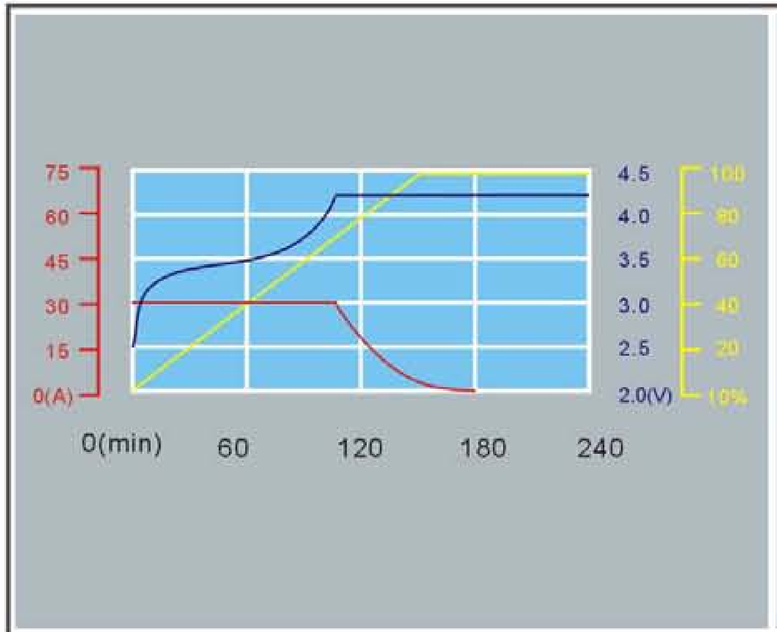


MODEL: TS–LFP60AHA

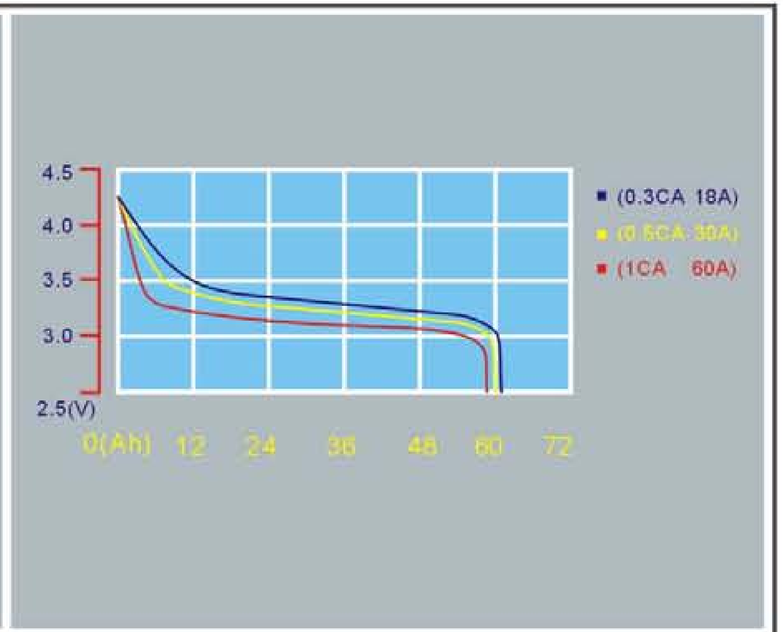


MODEL: TS–LFP60AHA

Nominal capacity	60AH	Operation Voltage	Charge: 4.25V Discharge: 2.5V
Max Charge Current	≤3CA	Max Discharge Current	Constant Current ≤ 3CA Impulse Current ≤10CA
Standard Charge/ Discharge Current	0.3CA	Cycle Life	(80DOD%) ≥2000Times (70DOD%) ≥3000Times
Temperature Durability Of Case	≤250℃	Operating Temperature	Charge: –25℃~75℃ Discharge: –25℃~75℃
Self–discharge Rate	≤3%	Weight	2.5kg ± 100g



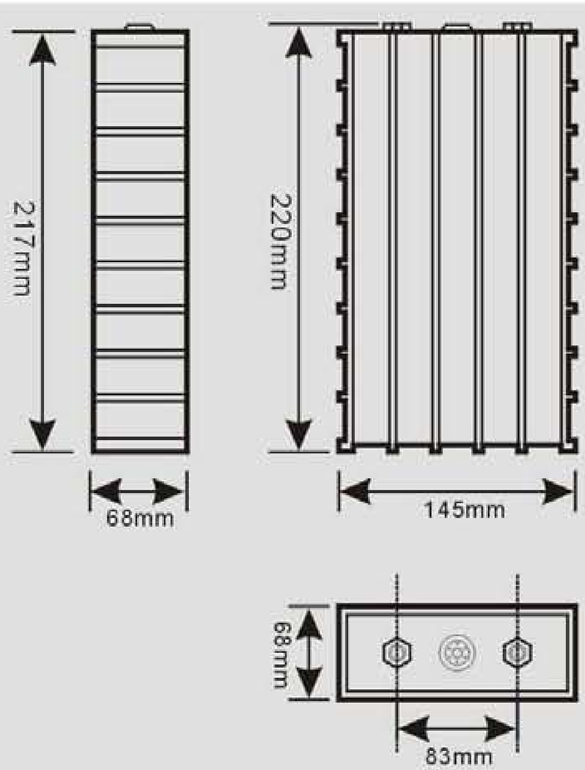
TS–LFP60AHA CHARGE AT TEMPERATURE OF 25℃



TS–LFP60AHA DISCHARGE AT TEMPERATURE OF 25℃

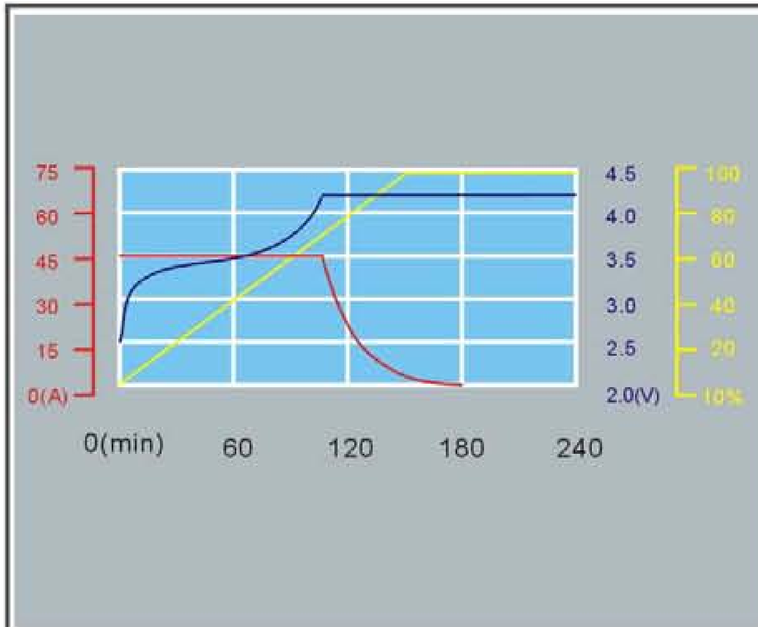
DIMENSIONS

MODEL: TS–LFP90AHA

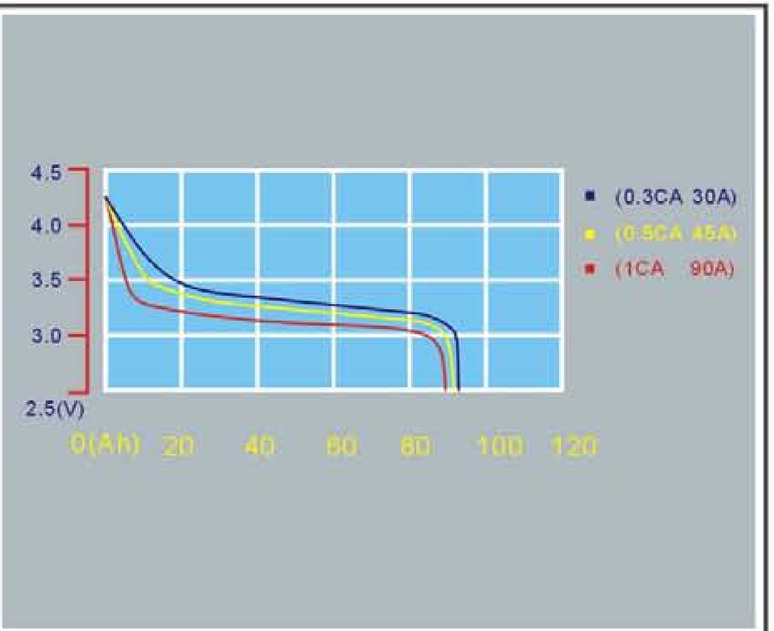


MODEL: TS–LFP90AHA

Nominal capacity	90AH	Operation Voltage	Charge: 4.25V
			Discharge: 2.5V
Max Charge Current	≤3CA	Max Discharge Current	Constant Current ≤3CA
			Impulse Current ≤10CA
Standard Charge/ Discharge Current	0.3CA	Cycle Life	(80DOD%) ≥2000Times
			(70DOD%) ≥3000Times
Temperature Durability Of Case	≤250℃	Operating Temperature	Charge: –25℃~75℃
			Discharge: –25℃~75℃
Self–discharge Rate	≤3%	Weight	3kg ± 100g



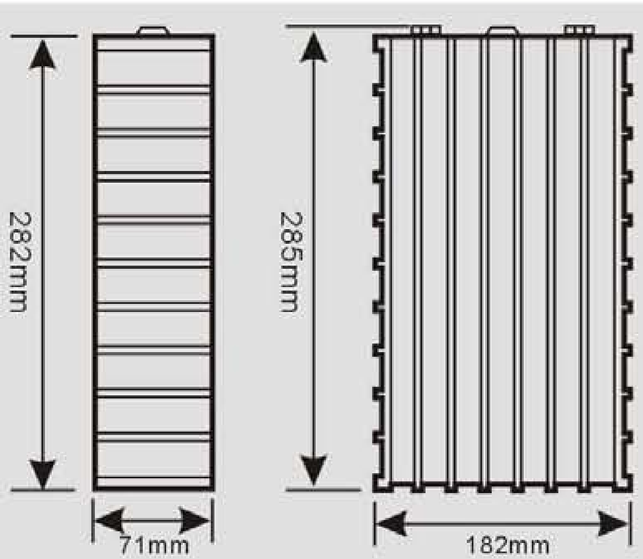
TS–LFP90AHA CHARGE AT TEMPERATURE OF 25℃



TS–LFP90AHA DISCHARGE AT TEMPERATURE OF 25℃

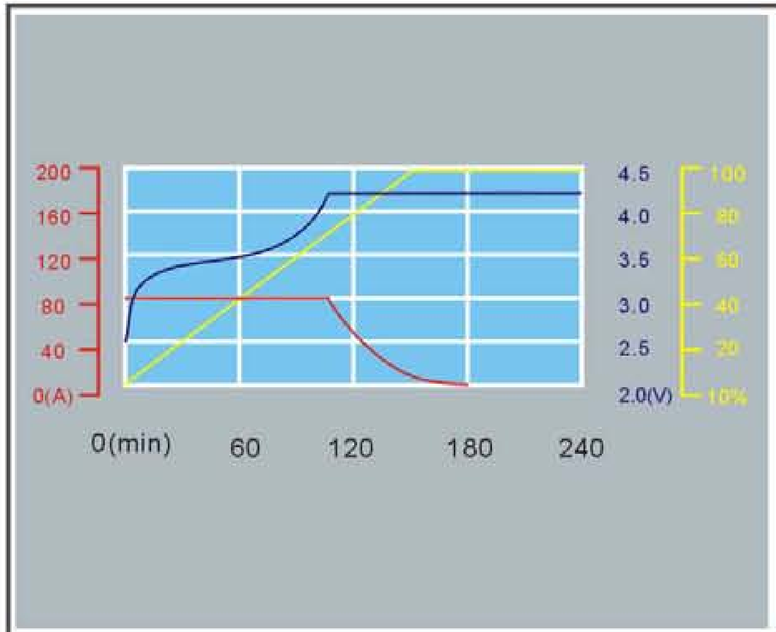
DIMENSIONS

MODEL: TS–LFP160AHA

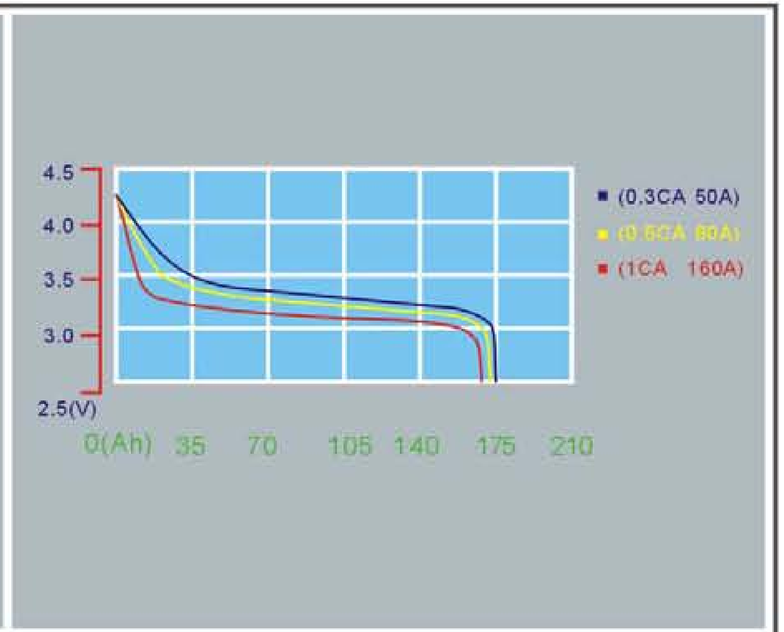


MODEL: TS–LFP160AHA

Nominal capacity	160AH	Operation Voltage	Charge: 4.25V
			Discharge: 2.5V
Max Charge Current	≤3CA	Max Discharge Current	Constant Current ≤ 3CA
			Impulse Current≤ 10CA
Standard Charge/ Discharge Current	0.3CA	Cycle Life	(80DOD%) ≥2000Times
			(70DOD%) ≥3000Times
Temperature Durability Of Case	≤250℃	Operating Temperature	Charge: –25℃~75℃
			Discharge: –25℃~75℃
Self–discharge Rate	≤3%	Weight	5.6kg ± 100g



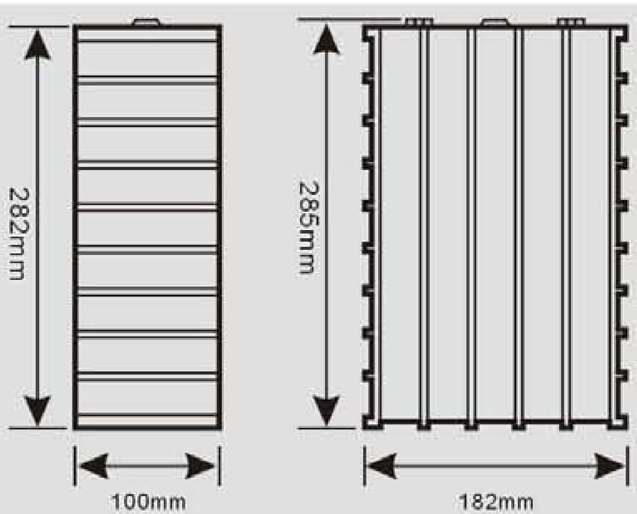
TS–LFP160AHA CHARGE AT TEMPERATURE OF 25℃



TS–LFP160AHA DISCHARGE AT TEMPERATURE OF 25℃

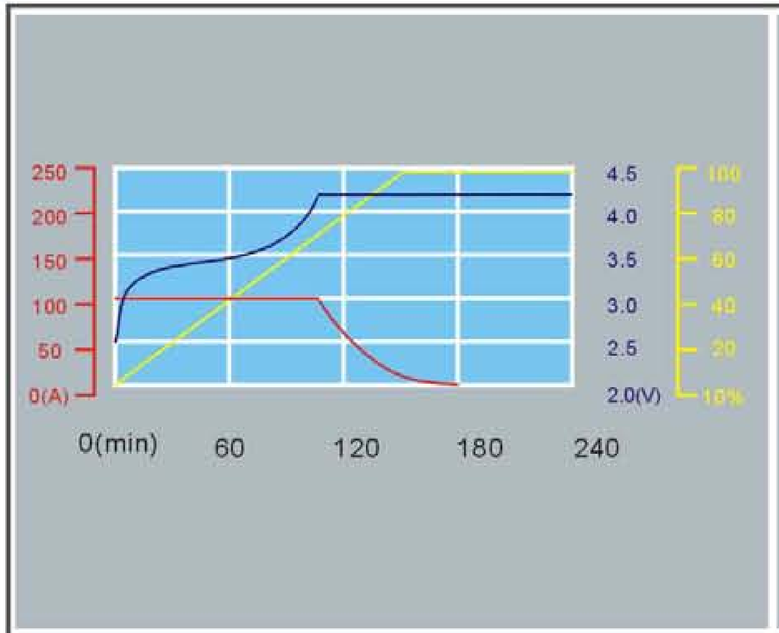
DIMENSIONS

MODEL: TS–LFP200AHA

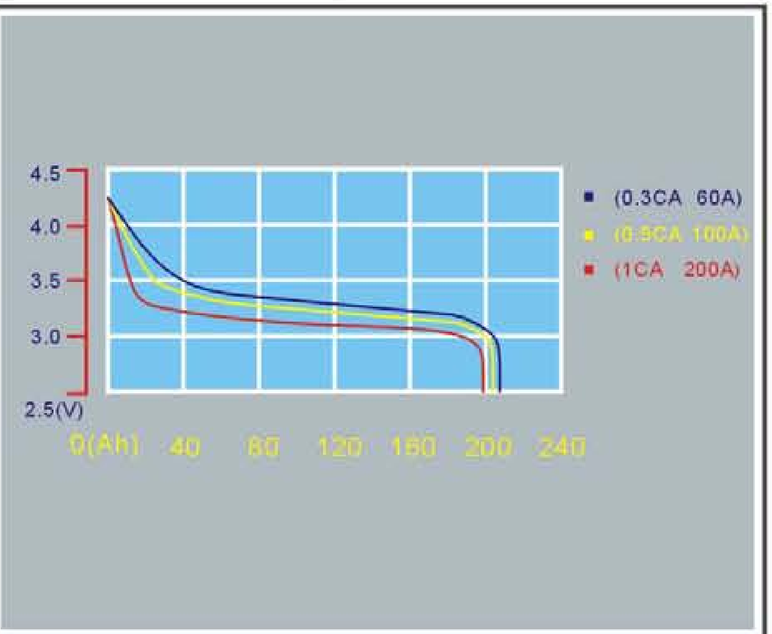


MODEL: TS–LFP200AHA

Nominal capacity	200AH	Operation Voltage	Charge: 4.25V
			Discharge: 2.5V
Max Charge Current	⩽3CA	Max Discharge Current	Constant Current ⩽ 2CA
			Impulse Current⩽ 10CA
Standard Charge/ Discharge Current	0.3CA	Cycle Life	(80DOD%) ⩾2000Times
			(70DOD%) ⩾3000Times
Temperature Durability Of Case	⩽250℃	Operating Temperature	Charge: –25℃~75℃
			Discharge: –25℃~75℃
Self–discharge Rate	⩽3%	Weight	7.6kg±200g



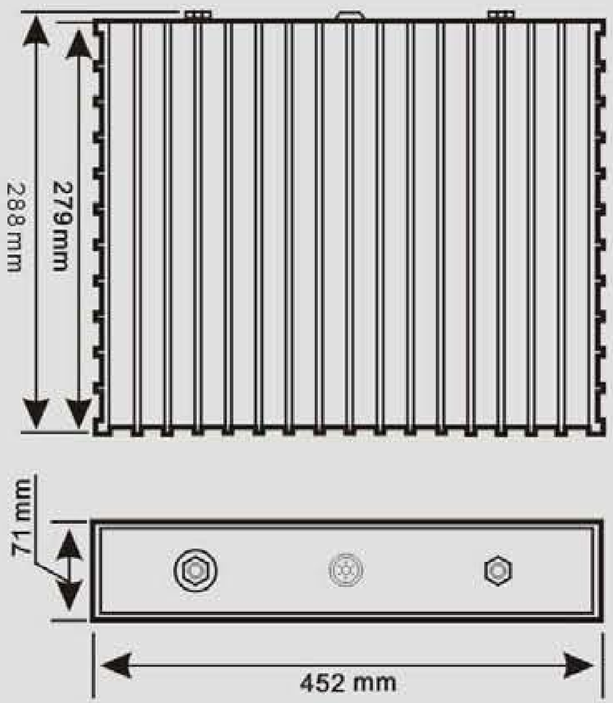
TS–LFP200AHA CHARGE AT TEMPERATURE OF 25℃



TS–LFP200AHA DISCHARGE AT TEMPERATURE OF 25℃

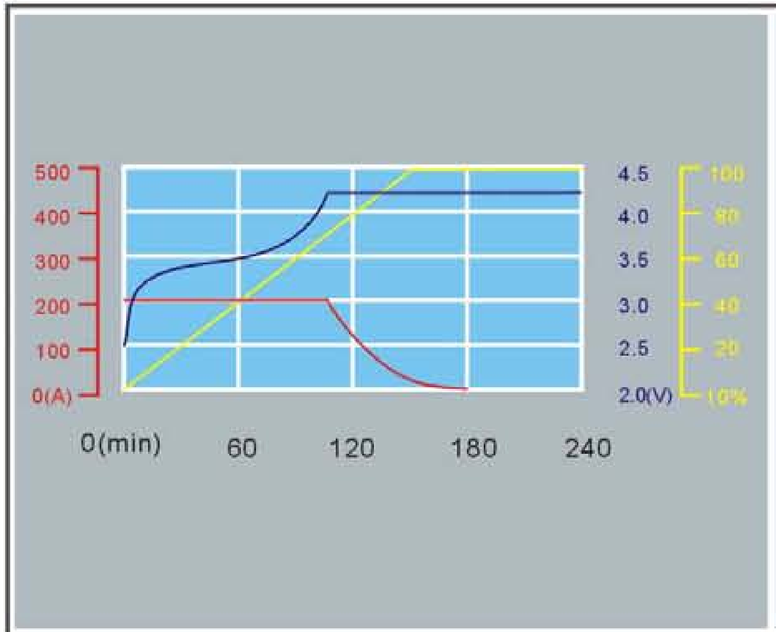
DIMENSIONS

MODEL: TS–LFP400AHA

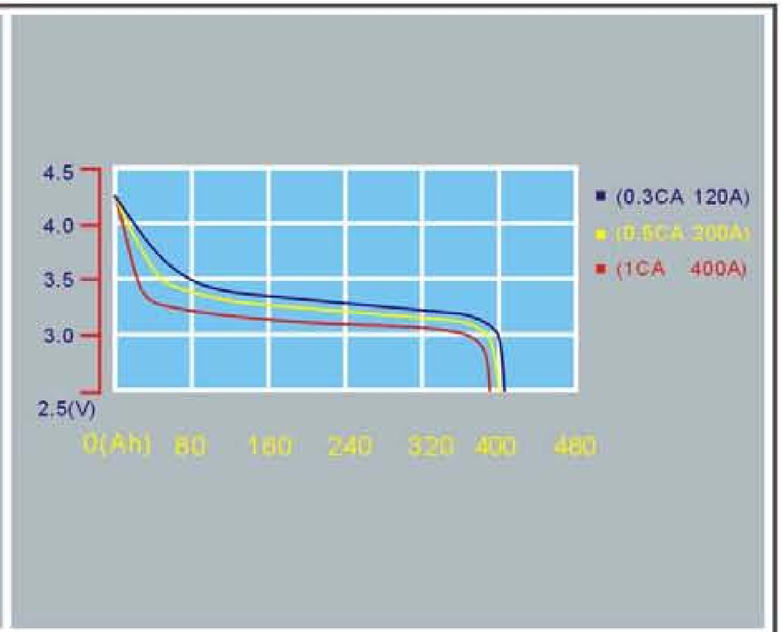


MODEL: TS–LFP400AHA

Nominal capacity	400AH	Operation Voltage	Charge: 4.25V Discharge: 2.5V
Max Charge Current	≤2CA	Max Discharge Current	Constant Current ≤ 2CA Impulse Current≤ 10CA
Standard Charge/ Discharge Current	0.3CA	Cycle Life	(80DOD%) ≥2000Times (70DOD%) ≥3000Times
Temperature Durability Of Case	≤250℃	Operating Temperature	Charge: –25℃~75℃ Discharge: –25℃~75℃
Self–discharge Rate	≤3%	Weight	13kg ± 150g



TS–LFP400AHA CHARGE AT TEMPERATURE OF 25℃



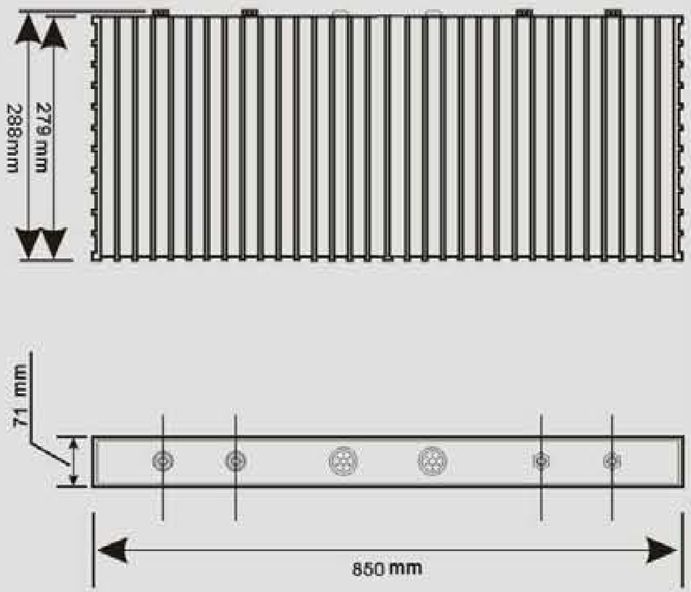
TS–LFP400AHA DISCHARGE AT TEMPERATURE OF 25℃

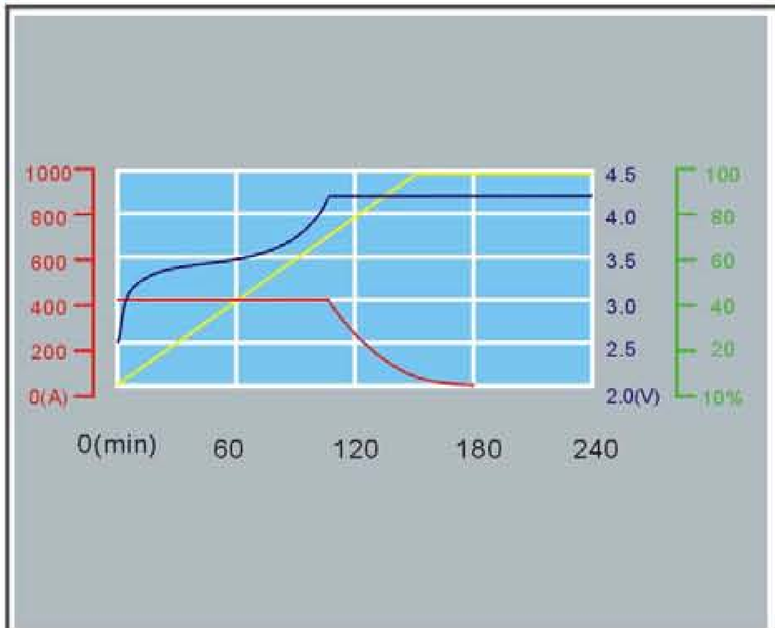
DIMENSIONS

MODEL: TS–LFP800AHA

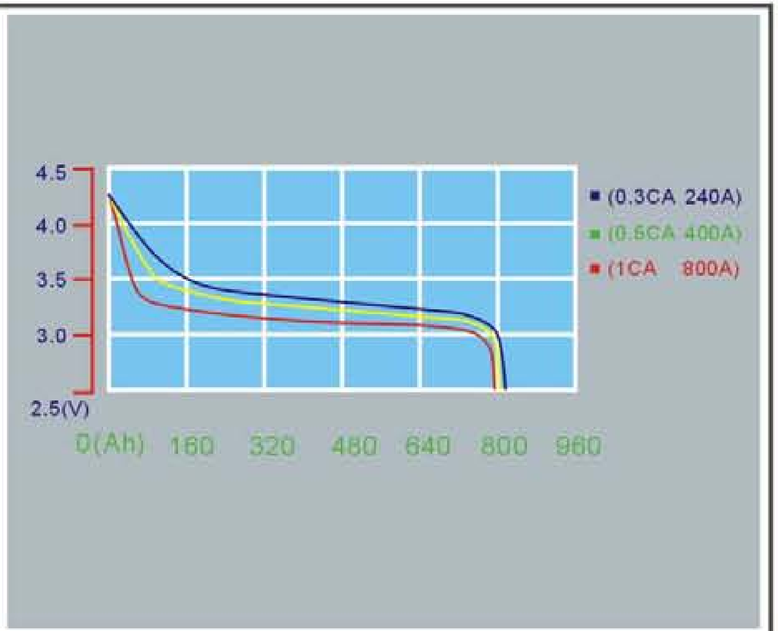
MODEL: TS–LFP800AHA

Nominal capacity	800AH	Operation Voltage	Charge: 4.25V
			Discharge: 2.5V
Max Charge Current	≤1CA	Max Discharge Current	Constant Current ≤ 1CA
			Impulse Current ≤ 10CA
Standard Charge/ Discharge Current	0.3CA	Cycle Life	(80DOD%) ≥2000Times
			(70DOD%) ≥3000Times
Temperature Durability Of Case	≤250℃	Operating Temperature	Charge: –25℃~75℃
			Discharge: –25℃~75℃
Self–discharge Rate	≤3%	Weight	25kg±300g





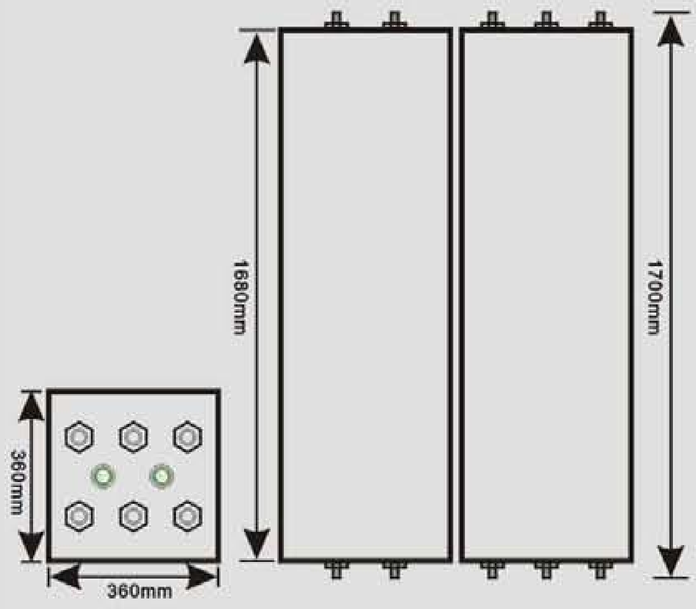
TS–LFP800AHA CHARGE AT TEMPERATURE OF 25℃



TS–LFP800AHA DISCHARGE AT TEMPERATURE OF 25℃

DIMENSIONS

MODEL: TS–LFP9000AHB



MODEL: TS–LFP9000AHB

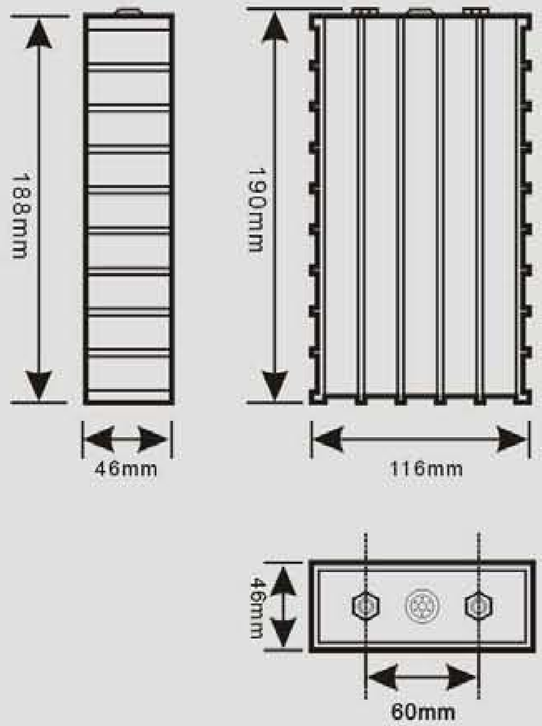
Single cell specifications

■ Nominal Capacity: 9000AH ■ Operating Voltage: 2.5V–––4.25V ■The impedance of single cell with full capacity at temperature lower than 30℃:≤2.5mΩ ■ Short current of single cell with full capacity at temperature lower than 30℃: approx 80KA ■ Dimension of single cell: **Height :** 1700mm (Net height not include terminal : 1680mm) **Length:** 360mm **Width:** 360mm **Weight:** ≤350KG±6KG■Self–Discharging rate: ≤3% (monthly)

Discharge time	Discharge current	Capacity	Initial voltage	Lowest voltage
1h	9000A	8500Ah	3.2V	2.5V
2h	4500A	9000Ah	3.3V	2.5V
3h	3000A	9000Ah	3.3V	2.5V
4h	2250A	9000Ah	3.4V	2.5V
10h	900A	9000Ah	3.4V	2.5V
20h	450A	9000Ah	3.5V	2.5V
50h	180A	9000Ah	3.7V	2.5V
100h	90A	9000Ah	3.8V	2.5V

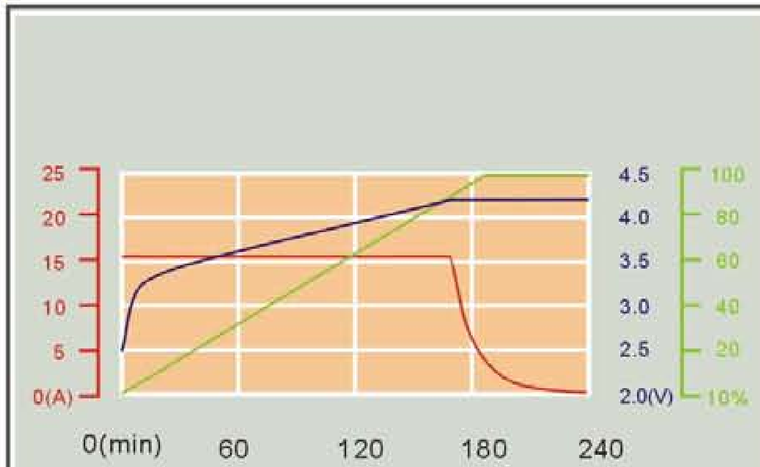
DIMENSIONS

MODEL: TS–LCP50AHA



MODEL: TS–LCP50AHA

Nominal capacity	50AH	Operation Voltage	Charge: 4.2V
			Discharge: 3.0V
Max Charge Current	≤0.5CA	Max Discharge Current	Constant Current ≤ 3CA
			Impulse Current ≤ 10CA
Standard Charge/ Discharge Current	0.3CA	Cycle Life	(80DOD%) ≥1000Times
			(70DOD%) ≥2000Times
Temperature Durability Of Case	≤250℃	Operating Temperature	Charge: –25℃~75℃
			Discharge: –25℃~75℃
Self–discharge Rate	≤2%	Weight	1.6kg ± 20g

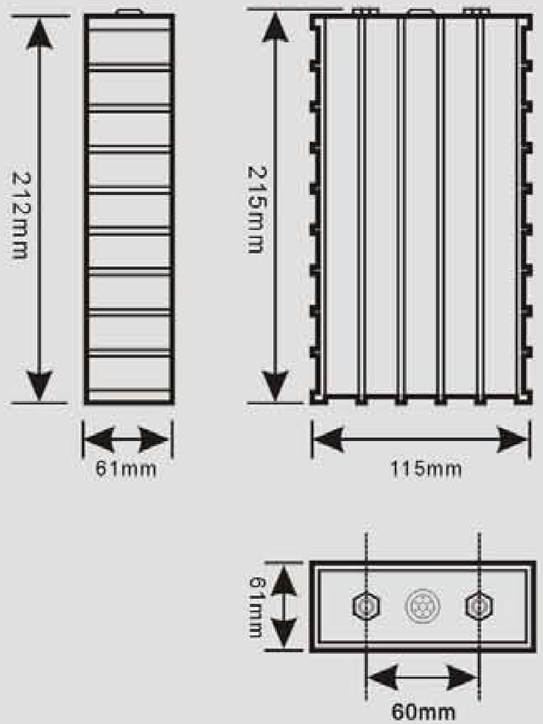


TS–LCP50AHA CHARGE AT TEMPERATURE OF 25℃

TS–LCP50AHA DISCHARGE AT TEMPERATURE OF 25℃

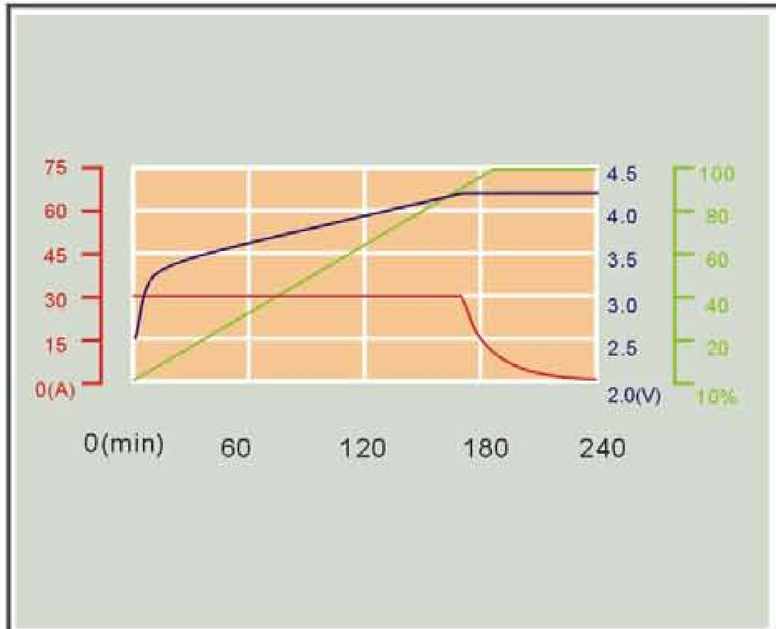
DIMENSIONS

MODEL: TS–LCP90AHA

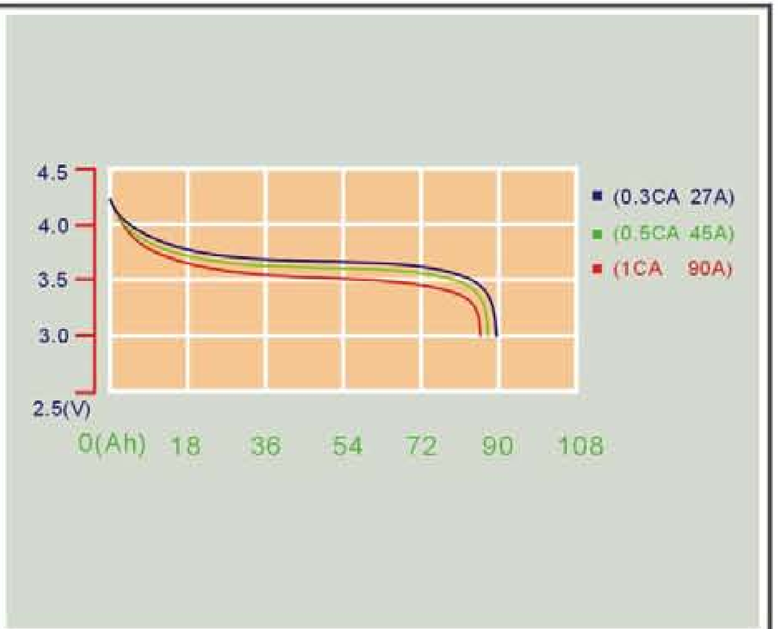


MODEL: TS–LCP90AHA

Nominal capacity	90AH	Operation Voltage	Charge: 4.2V
			Discharge: 3.0V
Max Charge Current	≤0.5CA	Max Discharge Current	Constant Current ≤ 3CA
			Impulse Current ≤ 10CA
Standard Charge/ Discharge Current	0.3CA	Cycle Life	(80DOD%) ≥1000Times
			(70DOD%) ≥2000Times
Temperature Durability Of Case	≤250℃	Operating Temperature	Charge: –25℃~75℃
			Discharge: –25℃~75℃
Self–discharge Rate	≤2%	Weight	2.4kg ± 100g



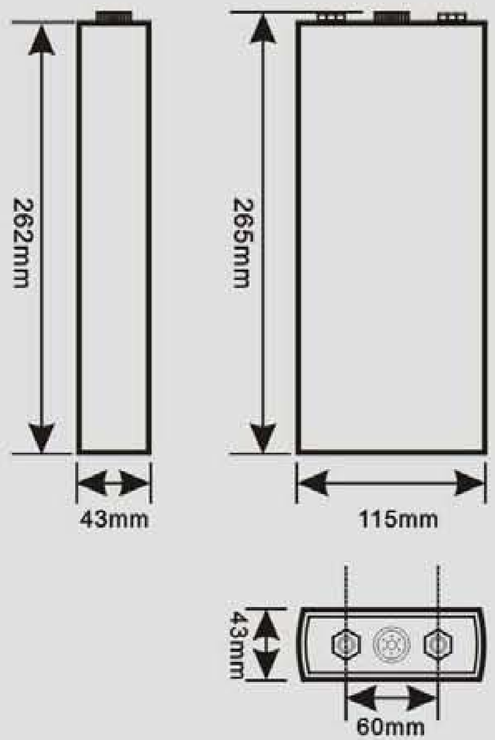
TS–LCP90AHA CHARGE AT TEMPERATURE OF 25℃



TS–LCP90AHA DISCHARGE AT TEMPERATURE OF 25℃

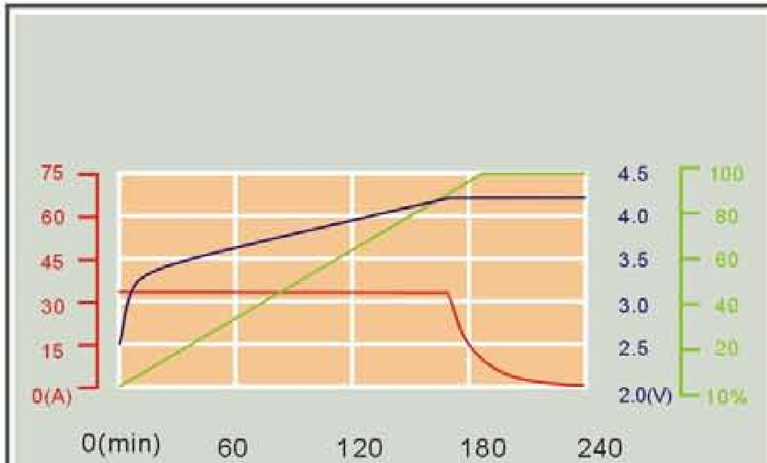
DIMENSIONS

MODEL: TS–LCP92AHA



MODEL: TS–LCP92AHA

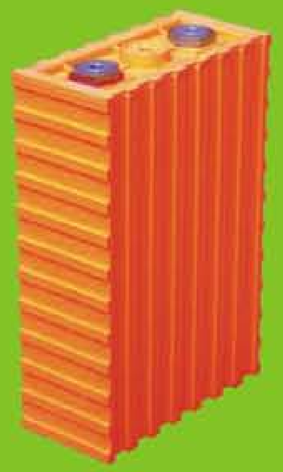
Nominal capacity	92AH	Operation Voltage	Charge: 4.2V
			Discharge: 3.0V
Max Charge Current	≤0.5CA	Max Discharge Current	Constant Current ≤ 3CA
			Impulse Current ≤ 10CA
Standard Charge/ Discharge Current	0.3CA	Cycle Life	(80DOD%) ≥1000Times
			(70DOD%) ≥2000Times
Temperature Durability Of Case	≤250℃	Operating Temperature	Charge: –25℃~75℃
			Discharge: –25℃~75℃
Self–discharge Rate	≤2%	Weight	2.4kg ± 30g



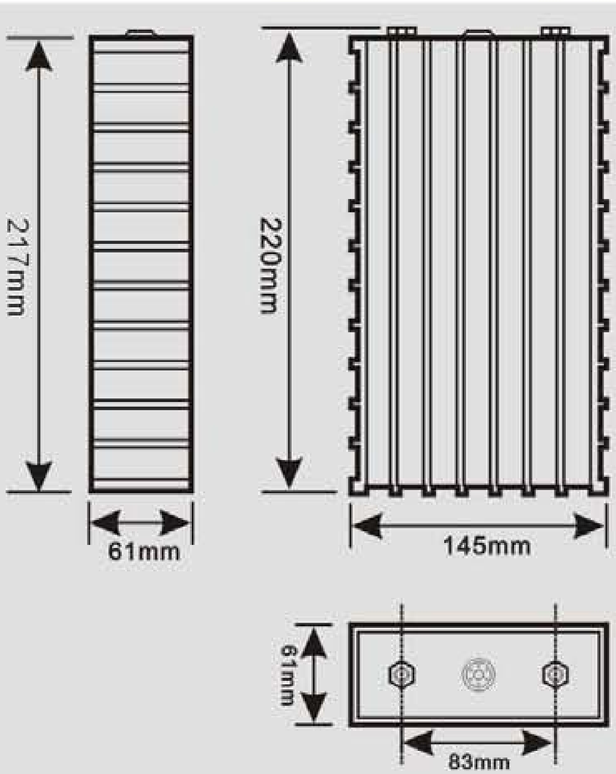
TS–LCP92AHA CHARGE AT TEMPERATURE OF 25℃

TS–LCP92AHA DISCHARGE AT TEMPERATURE OF 25℃

DIMENSIONS

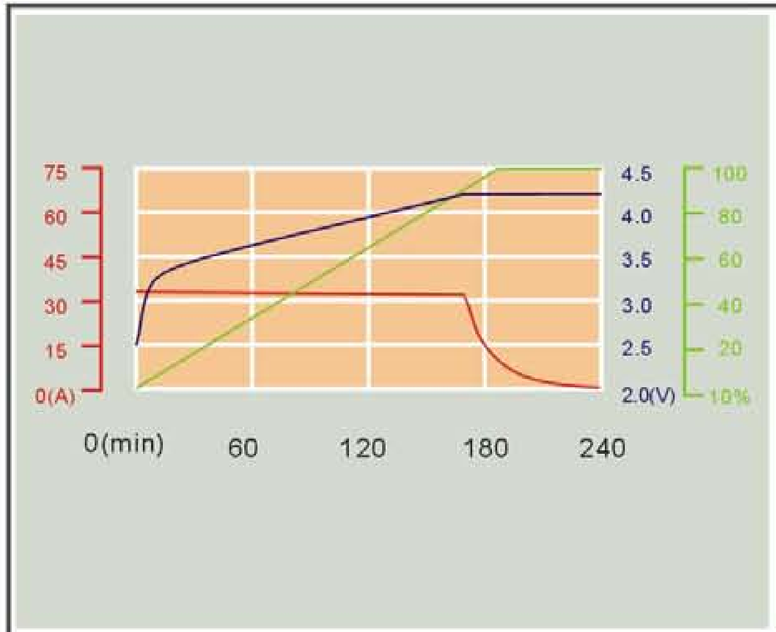


MODEL: TS–LCP100AHA

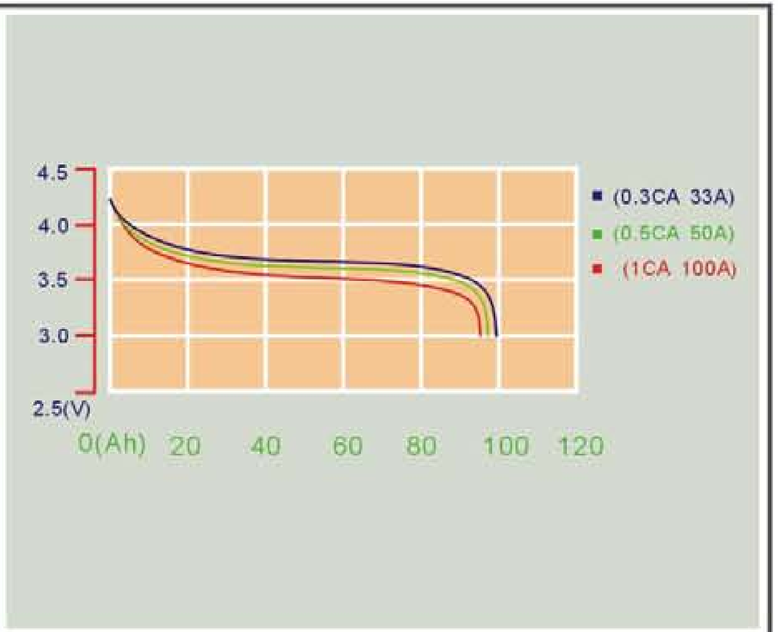


MODEL: TS–LCP100AHA

Nominal capacity	100AH	Operation Voltage	Charge: 4.2V
			Discharge: 3.0V
Max Charge Current	≤0.5CA	Max Discharge Current	Constant Current ≤ 3CA
			Impulse Current ≤ 10CA
Standard Charge/ Discharge Current	0.3CA	Cycle Life	(80DOD%) ≥1000Times
			(70DOD%) ≥2000Times
Temperature Durability Of Case	≤250℃	Operating Temperature	Charge: –25℃~75℃
			Discharge: –25℃~75℃
Self–discharge Rate	≤2%	Weight	3kg ± 80g



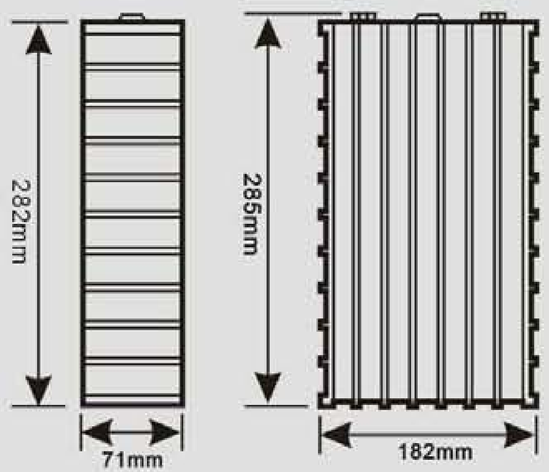
TS–LCP100AHA CHARGE AT TEMPERATURE OF 25℃



TS–LCP100AHA DISCHARGE AT TEMPERATURE OF 25℃

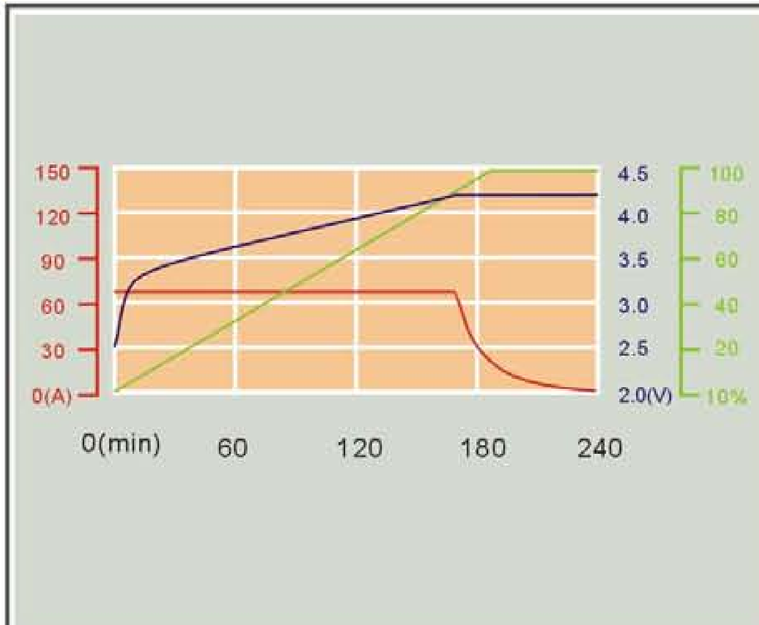
DIMENSIONS

MODEL: TS–LCP200AHA

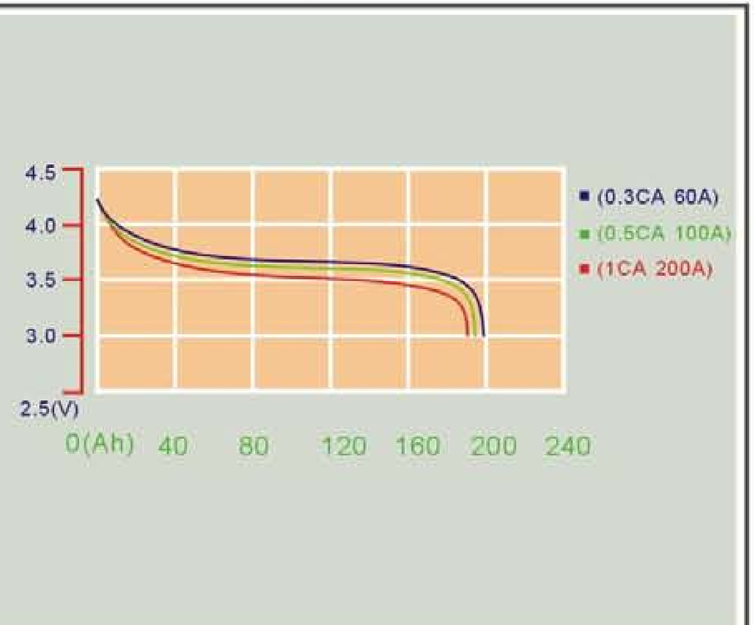


MODEL: TS–LCP200AHA

Nominal capacity	200AH	Operation Voltage	Charge: 4.2V
			Discharge: 3.0V
Max Charge Current	≤0.5CA	Max Discharge Current	Constant Current ≤ 3CA
			Impulse Current≤ 10CA
Standard Charge/ Discharge Current	0.3CA	Cycle Life	(80DOD%) ≥1000Times
			(70DOD%) ≥2000Times
Temperature Durability Of Case	≤250℃	Operating Temperature	Charge: –25℃~75℃
			Discharge: –25℃~75℃
Self–discharge Rate	≤2%	Weight	5.6kg ± 100g



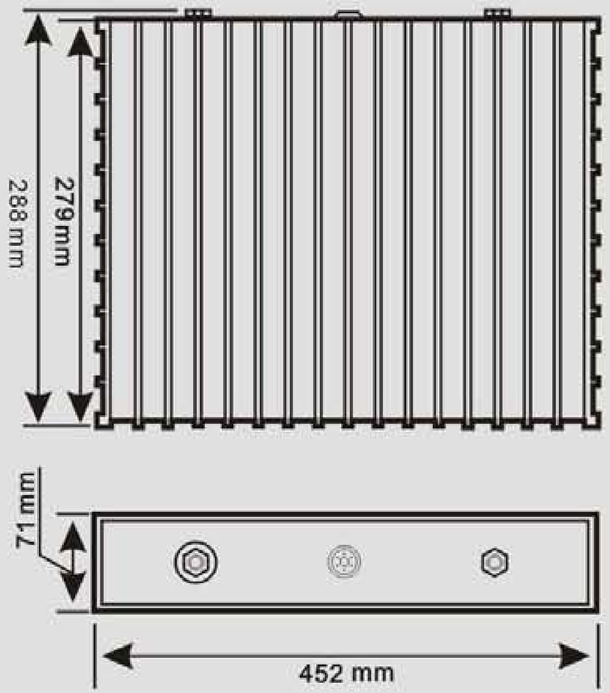
TS–LCP200AHA CHARGE AT TEMPERATURE OF 25℃



TS–LCP200AHA DISCHARGE AT TEMPERATURE OF 25℃

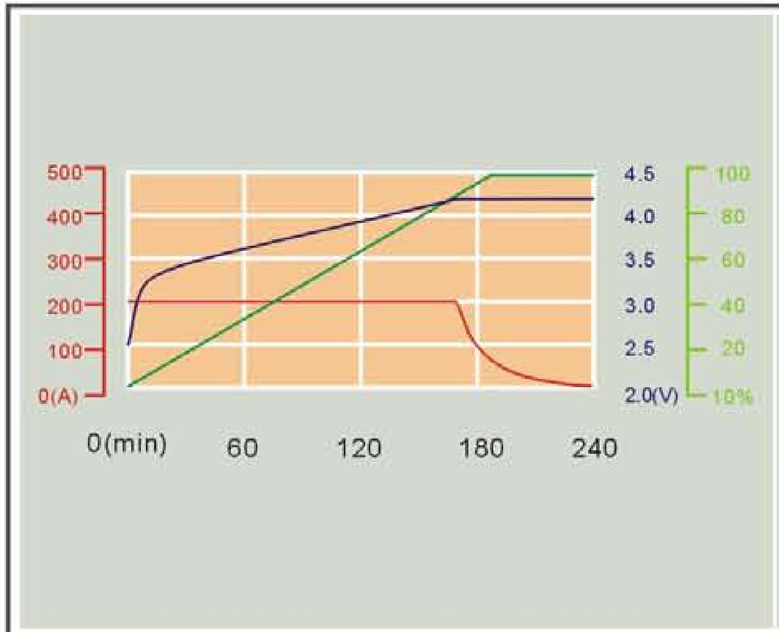
DIMENSIONS

MODEL: TS–LCP600AHA

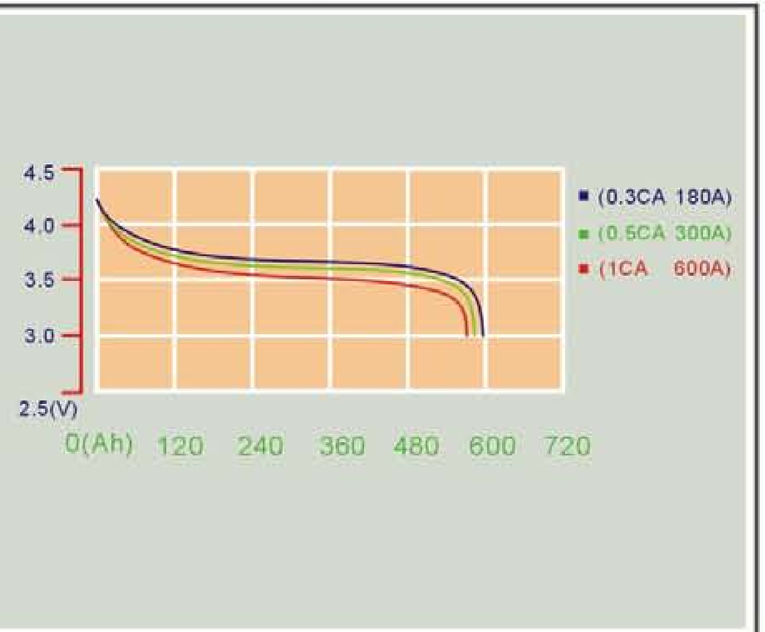


MODEL: TS–LCP600AHA

Nominal capacity	600AH	Operation Voltage	Charge: 4.2V
			Discharge: 3.0V
Max Charge Current	≤0.5CA	Max Discharge Current	Constant Current ≤ 2CA
			Impulse Current ≤ 10CA
Standard Charge/ Discharge Current	0.3CA	Cycle Life	(80DOD%) ≥1000Times
			(70DOD%) ≥2000Times
Temperature Durability Of Case	≤250℃	Operating Temperature	Charge: –25℃~75℃
			Discharge: –25℃~75℃
Self–discharge Rate	≤2%	Weight	14kg±200g



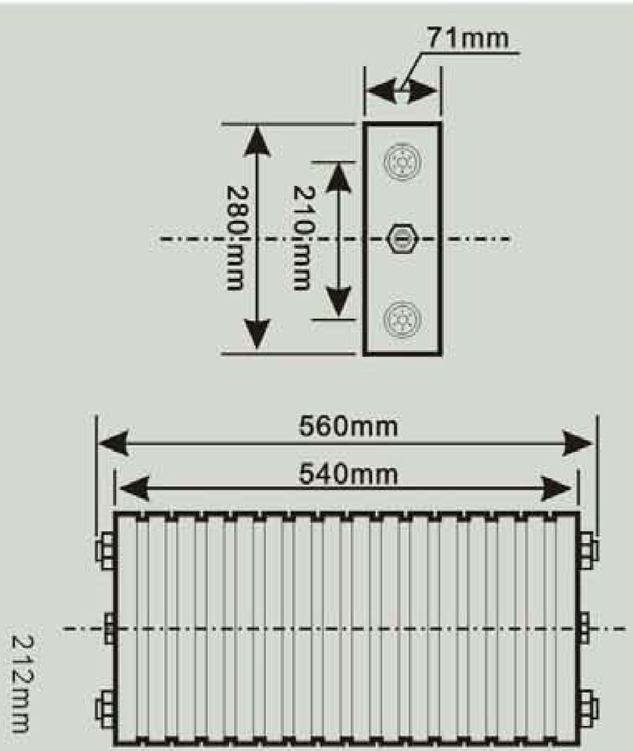
TS–LCP600AHA CHARGE AT TEMPERATURE OF 25℃



TS–LCP600AHA DISCHARGE AT TEMPERATURE OF 25℃

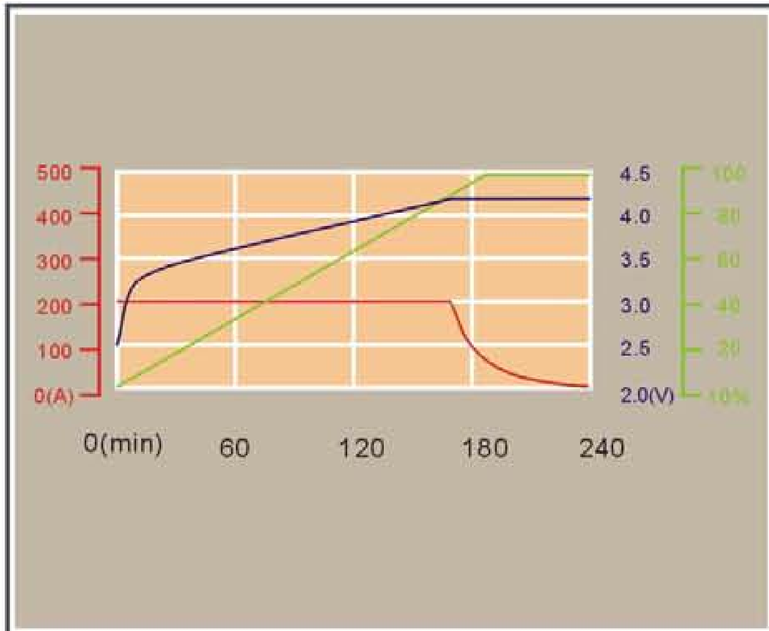
DIMENSIONS

MODEL: TS–LCP600AHB

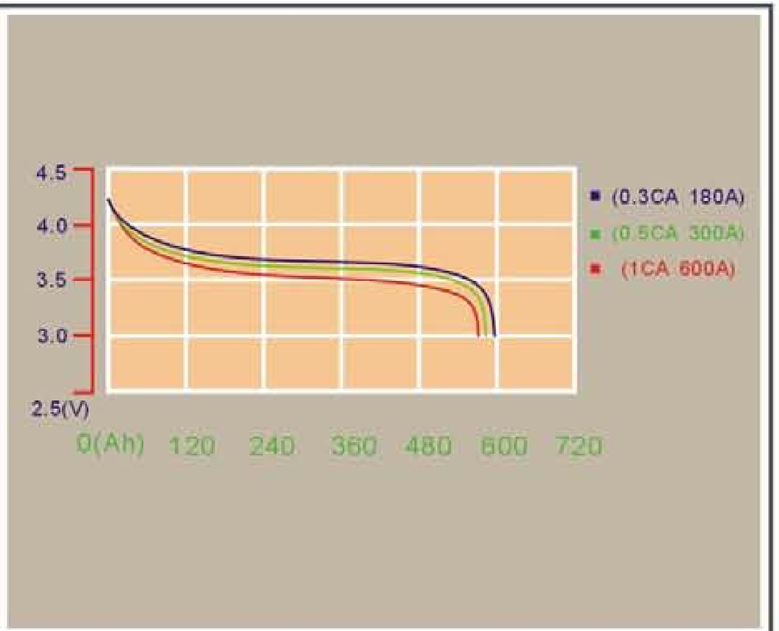


MODEL: TS–LCP600AHB

Nominal capacity	600AH	Operation Voltage	Charge: 4.2V
			Discharge: 3.0V
Max Charge Current	≤0.5CA	Max Discharge Current	Constant Current ≤ 2CA
			Impulse Current ≤10CA
Standard Charge/ Discharge Current	0.3CA	Cycle Life	(80DOD%) ≥1000Times
			(70DOD%) ≥2000Times
Temperature Durability Of Case	≤250℃	Operating Temperature	Charge: –25℃~75℃
			Discharge: –25℃~75℃
Self–discharge Rate	≤2%	Weight	14kg ± 200g



TS–LCP600AHB CHARGE AT TEMPERATURE OF 25℃



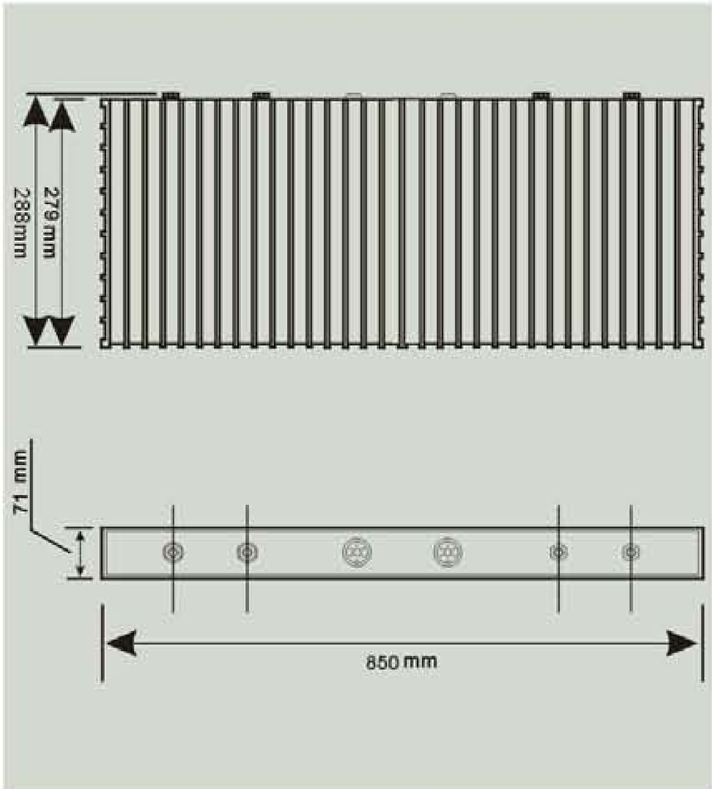
TS–LCP600AHB DISCHARGE AT TEMPERATURE OF 25℃

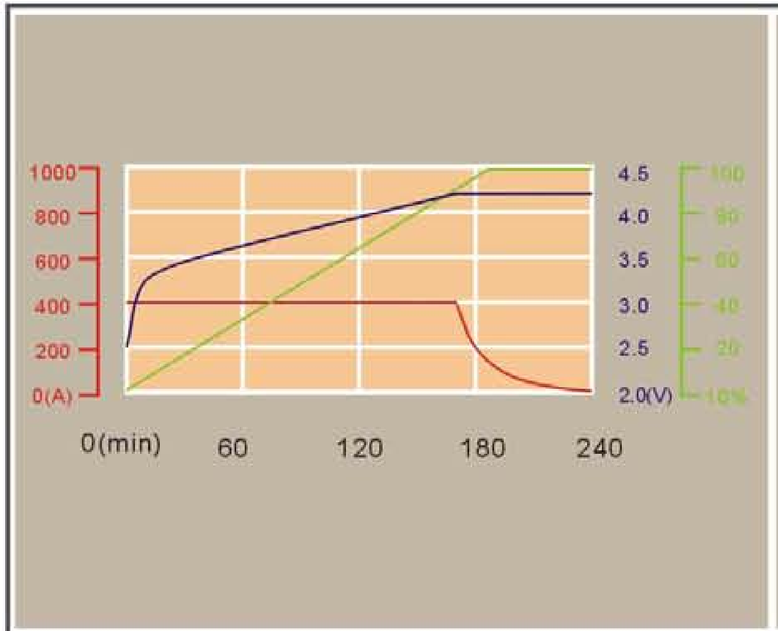
DIMENSIONS

MODEL: TS–LCP1200AHA

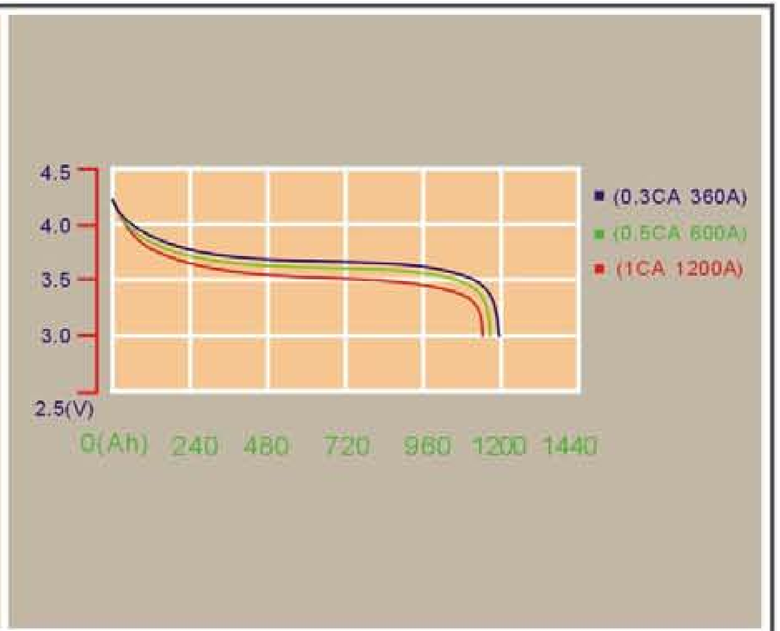
MODEL: TS–LCP1200AHA

Nominal capacity	1200AH	Operation Voltage	Charge: 4.2V
			Discharge: 3.0V
Max Charge Current	≤0.5CA	Max Discharge Current	Constant Current ≤1.5CA
			Impulse Current ≤10CA
Standard Charge/ Discharge Current	0.3CA	Cycle Life	(80DOD%) ≥1000Times
			(70DOD%) ≥2000Times
Temperature Durability Of Case	≤250℃	Operating Temperature	Charge: –25℃~75℃
			Discharge: –25℃~75℃
Self–discharge Rate	≤2%	Weight	27kg±500g





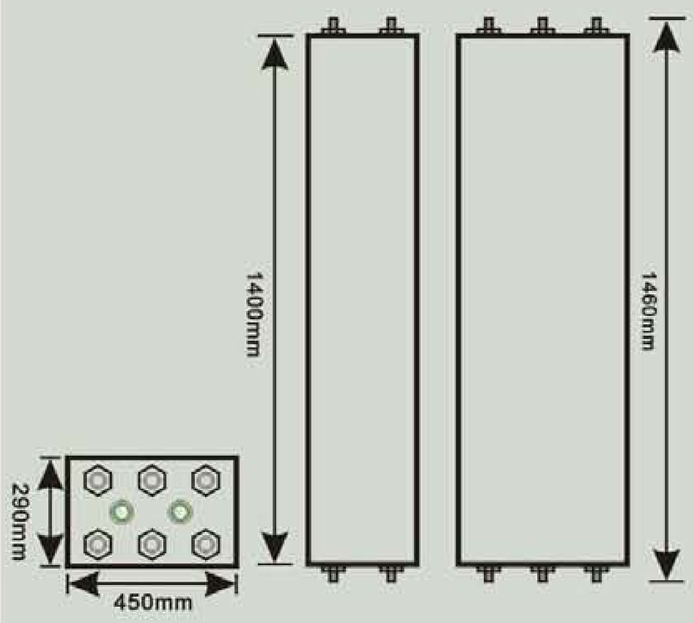
TS–LCP1200AHA CHARGE AT TEMPERATURE OF 25℃



TS–LCP1200AHA DISCHARGE AT TEMPERATURE OF 25℃

DIMENSIONS

MODEL: TS–LCP10000AHB



MODEL: TS–LCP10000AHB

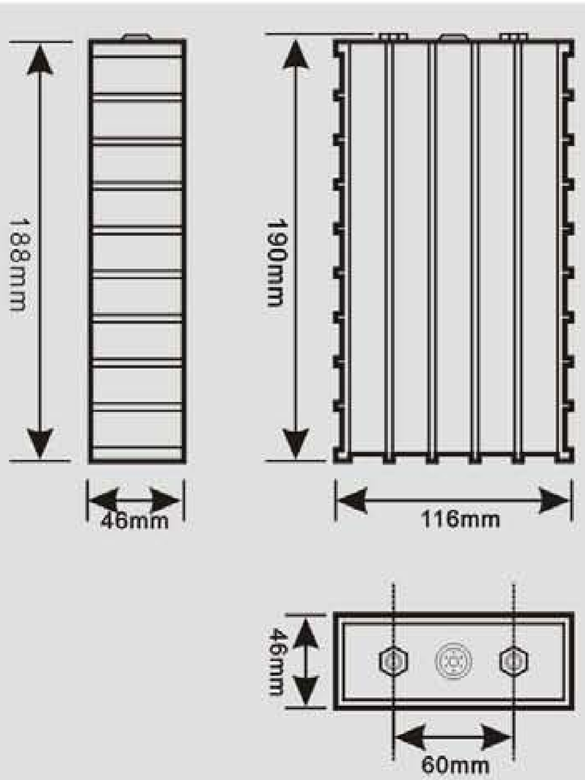
Single cell specifications

■ Nominal Capacity: 10000AH ■ Operating Voltage: 3.0V–––4.2V ■The impedance of single cell with full capacity at temperature lower than 30℃:≤2.5mΩ ■ Short current of single cell with full capacity at temperature lower than 30℃: approx 100KA ■ Dimension of single cell: **Height :** 1460mm (Net height not include terminal : 1400mm) **Length:** 450mm **Width:** 290mm **Weight:** ≤280KG±6KG ■ Self–Discharging Rate: ≤3% (monthly)

Discharge time	Discharge current	Capacity	Initial voltage	Lowest voltage
1h	10000A	9000Ah	3.9V	3.0V
2h	5000A	10000Ah	4.0V	3.0V
3h	3300A	10000Ah	4.1V	3.0V
4h	2500A	10000Ah	4.1V	3.0V
10h	1000A	10000Ah	4.1V	3.0V
20h	500A	10000Ah	4.15V	3.0V
50h	200A	10000Ah	4.16V	3.0V
100h	100A	10000Ah	4.16V	3.0V

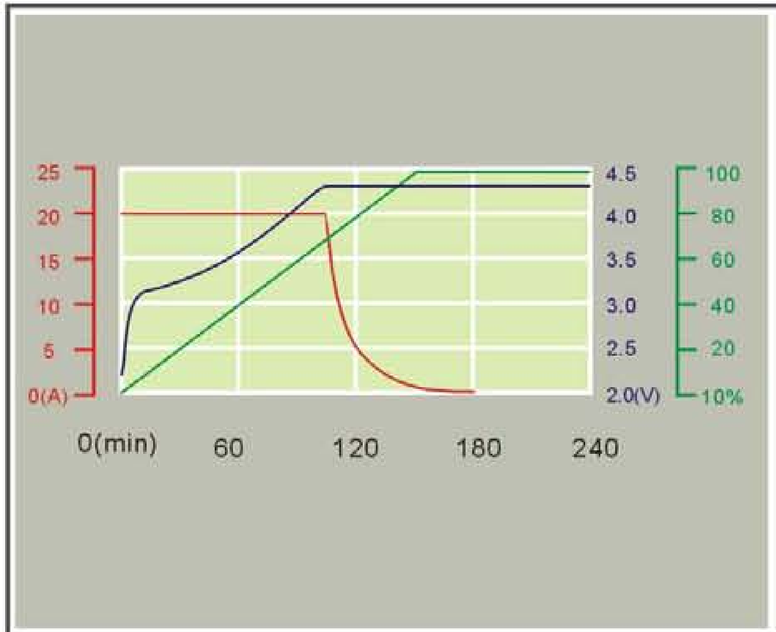
DIMENSIONS

MODEL: TS–LMP40AHA

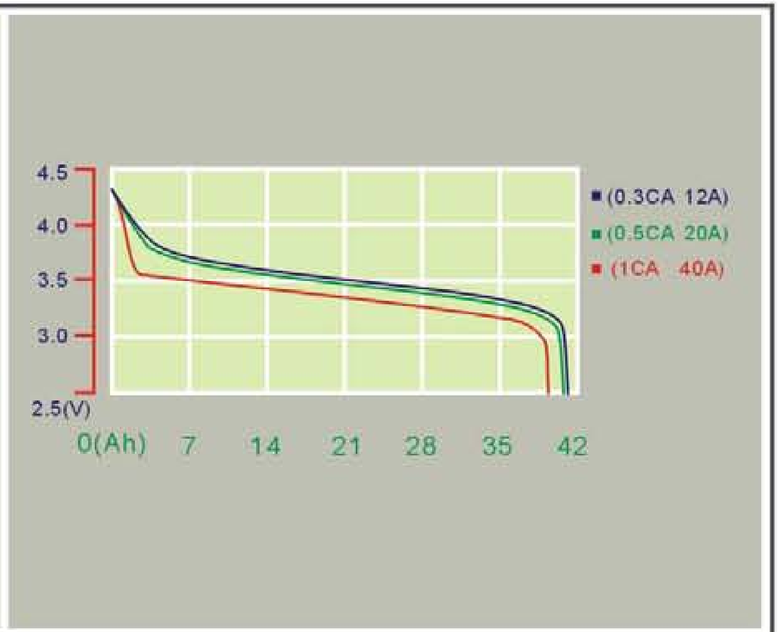


MODEL: TS–LMP40AHA

Nominal capacity	40AH	Operation Voltage	Charge: 4.35V
			Discharge: 2.2V
Max Charge Current	≤1CA	Max Discharge Current	Constant Current ≤ 3CA
			Impulse Current ≤ 10CA
Standard Charge/ Discharge Current	0.3CA	Cycle Life	(80DOD%) ≥ 300Times
			(70DOD%) ≥ 500Times
Temperature Durability Of Case	≤250℃	Operating Temperature	Charge: –25℃~75℃
			Discharge: –25℃~75℃
Self–discharge Rate	≤3%	Weight	1.6kg ± 100g



TS–LMP40AHA CHARGE AT TEMPERATURE OF 25℃



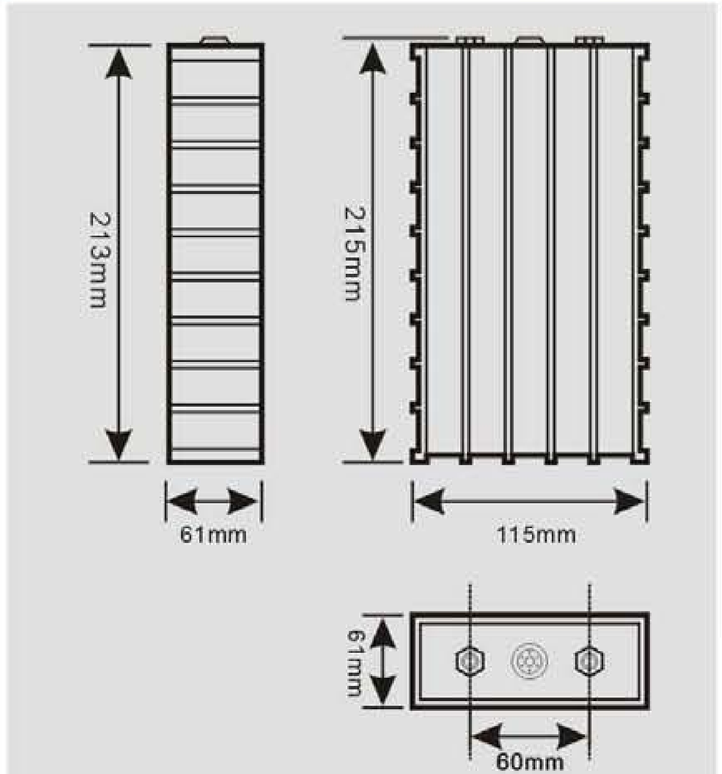
TS–LMP40AHA DISCHARGE AT TEMPERATURE OF 25℃

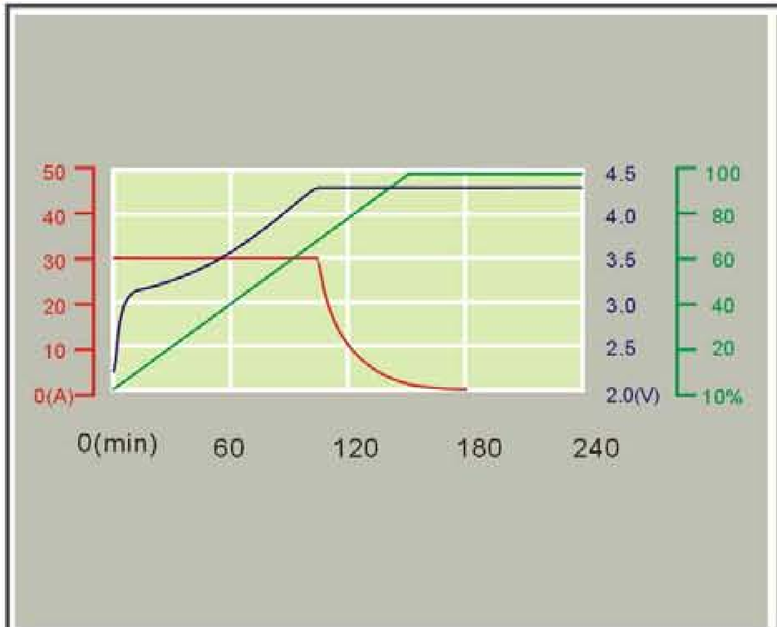
DIMENSIONS

MODEL: TS–LMP60AHA

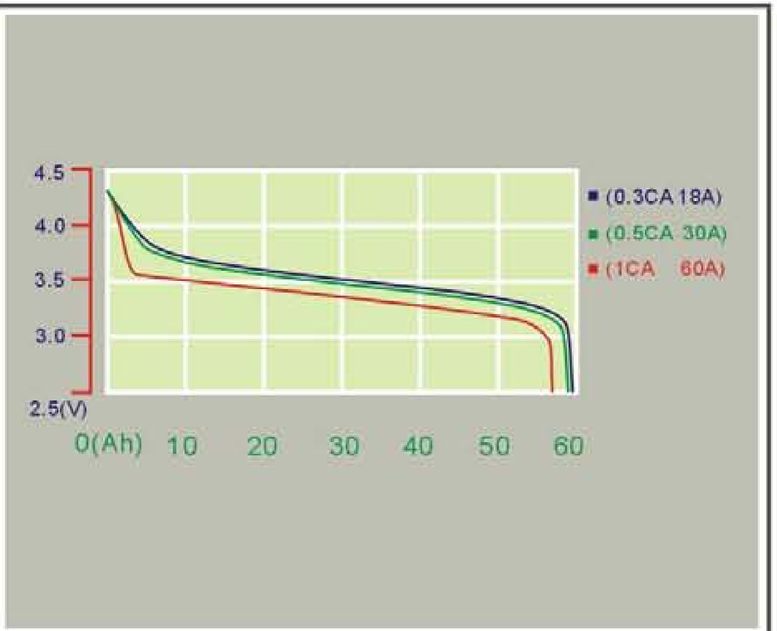
MODEL: TS–LMP60AHA

Nominal capacity	60AH	Operation Voltage	Charge: 4.35V
			Discharge: 2.2V
Max Charge Current	≤1CA	Max Discharge Current	Constant Current ≤3CA
			Impulse Current ≤10CA
Standard Charge/ Discharge Current	0.3CA	Cycle Life	(80DOD%) ≥ 300Times
			(70DOD%) ≥ 500Times
Temperature Durability Of Case	≤250℃	Operating Temperature	Charge: –25℃~75℃
			Discharge: –25℃~75℃
Self–discharge Rate	≤3%	Weight	2.5kg ± 100g





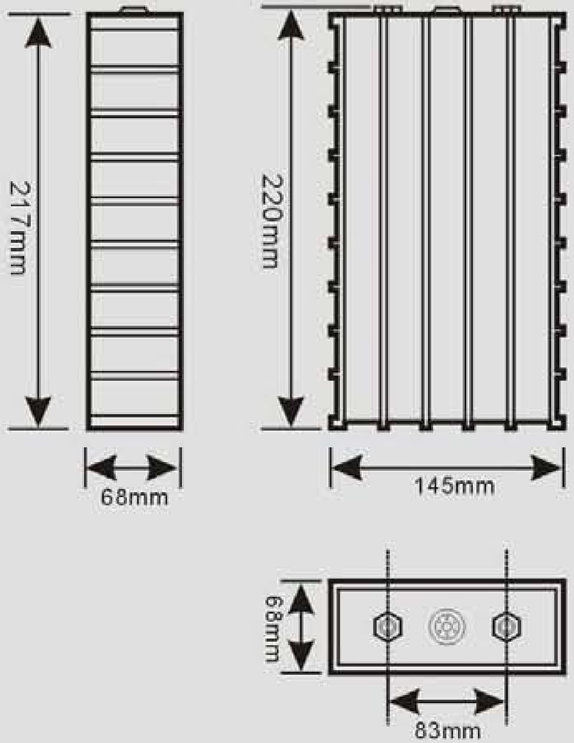
TS–LMP60AHA CHARGE AT TEMPERATURE OF 25℃



TS–LMP60AHA DISCHARGE AT TEMPERATURE OF 25℃

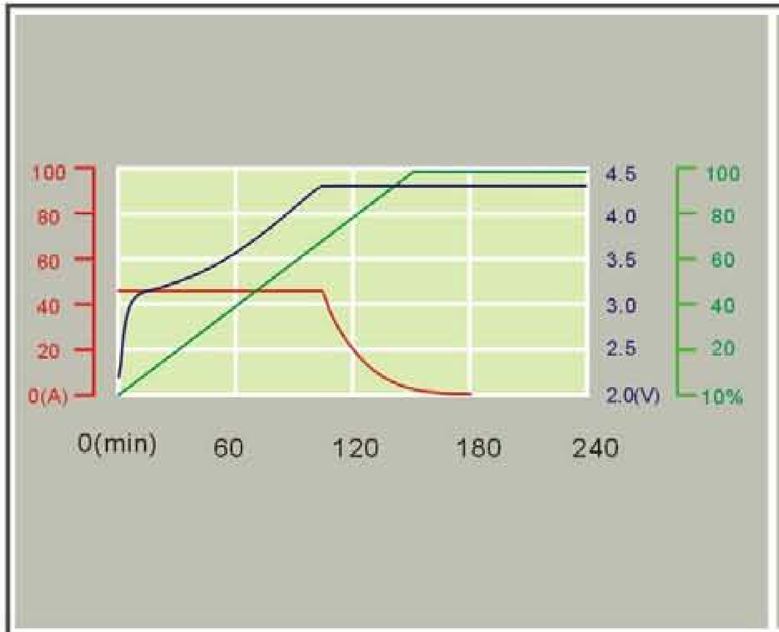
DIMENSIONS

MODEL: TS–LMP90AHA

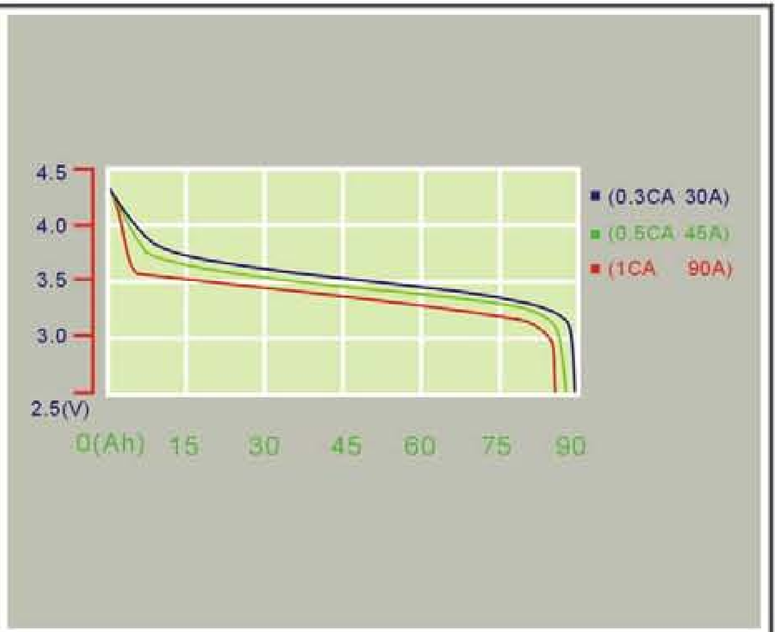


MODEL: TS–LMP90AHA

Nominal capacity	90AH	Operation Voltage	Charge: 4.35V
			Discharge: 2.2V
Max Charge Current	≤1CA	Max Discharge Current	Constant Current ≤ 3CA
			Impulse Current ≤ 10CA
Standard Charge/ Discharge Current	0.3CA	Cycle Life	(80DOD%)≥ 300Times
			(70DOD%)≥ 500Times
Temperature Durability Of Case	≤250℃	Operating Temperature	Charge: –25℃~75℃
			Discharge: –25℃~75℃
Self–discharge Rate	≤3%	Weight	3kg ± 100g



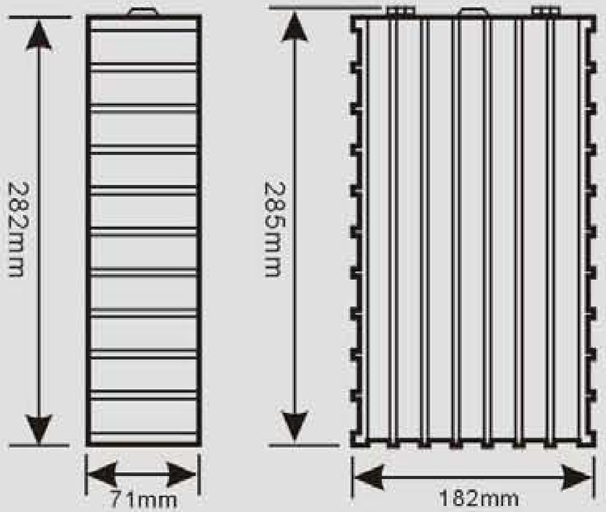
TS–LMP90AHA CHARGE AT TEMPERATURE OF 25℃



TS–LMP90AHA DISCHARGE AT TEMPERATURE OF 25℃

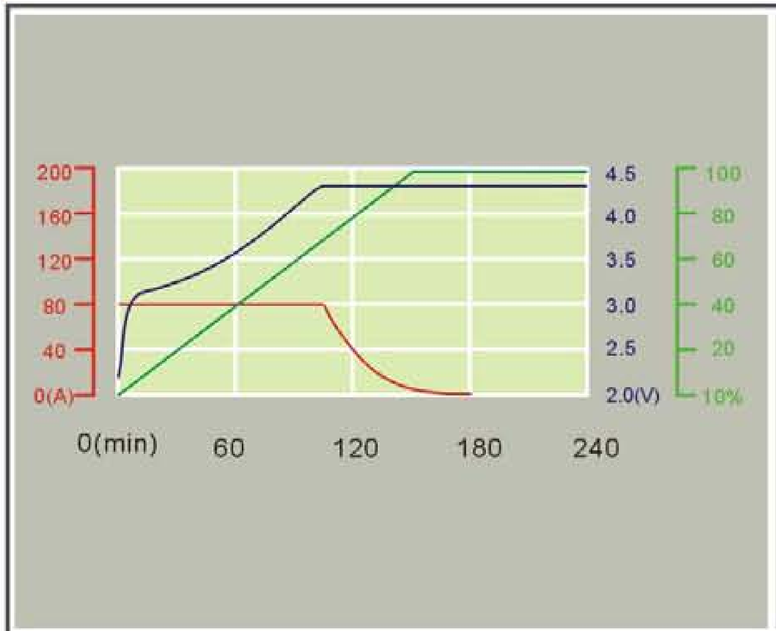
DIMENSIONS

MODEL: TS–LMP160AHA

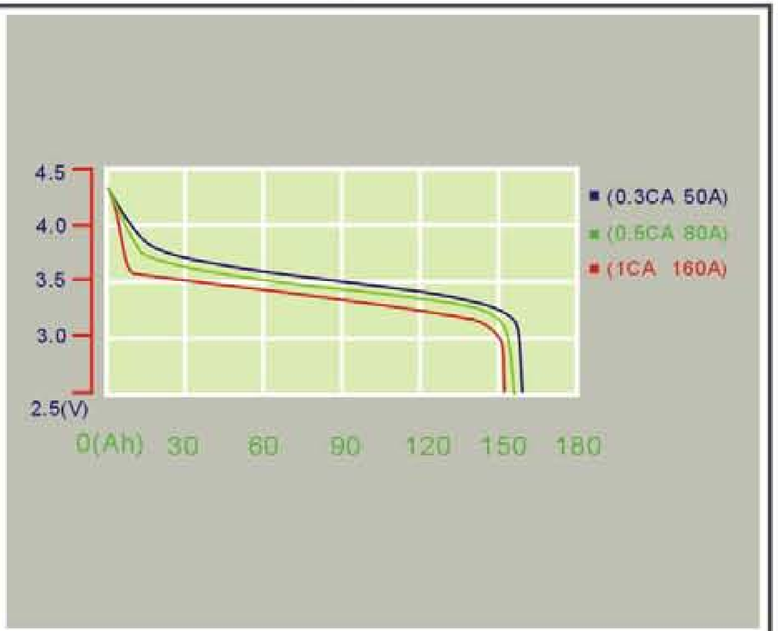


MODEL: TS–LMP160AHA

Nominal capacity	160AH	Operation Voltage	Charge: 4.35V
			Discharge: 2.2V
Max Charge Current	≤1CA	Max Discharge Current	Constant Current ≤ 2CA
			Impulse Current ≤10CA
Standard Charge/ Discharge Current	0.3CA	Cycle Life	(80DOD%) ≥ 300Times
			(70DOD%) ≥ 500Times
Temperature Durability Of Case	≤250℃	Operating Temperature	Charge: –25℃~75℃
			Discharge: –25℃~75℃
Self–discharge Rate	≤3%	Weight	5.6kg ± 100g



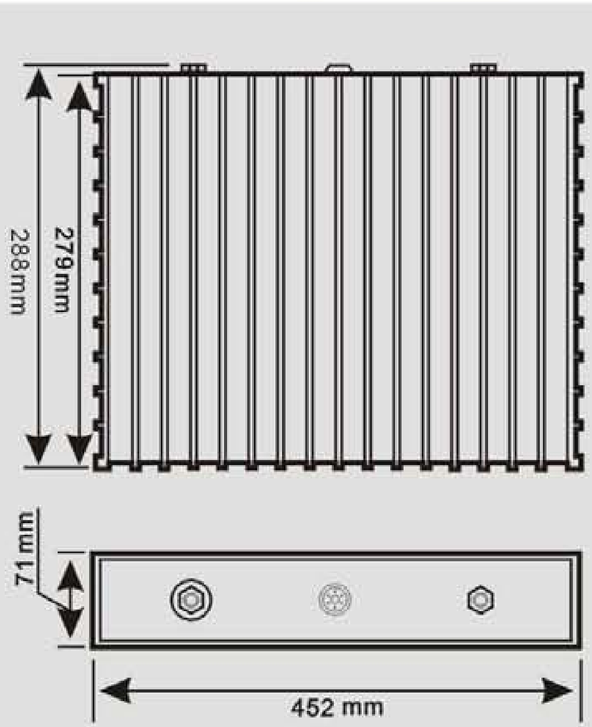
TS–LMP160AHA CHARGE AT TEMPERATURE OF 25℃



TS–LMP160AHA DISCHARGE AT TEMPERATURE OF 25℃

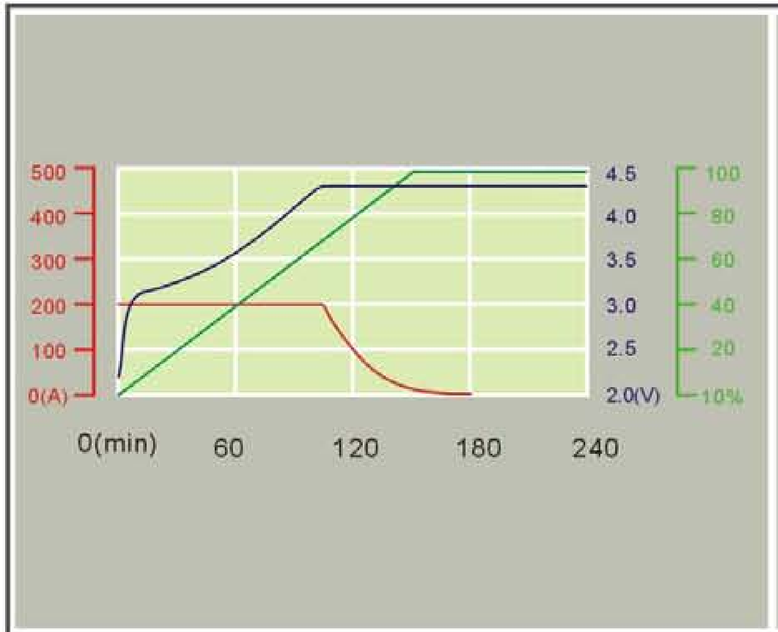
DIMENSIONS

MODEL: TS–LMP400AHA

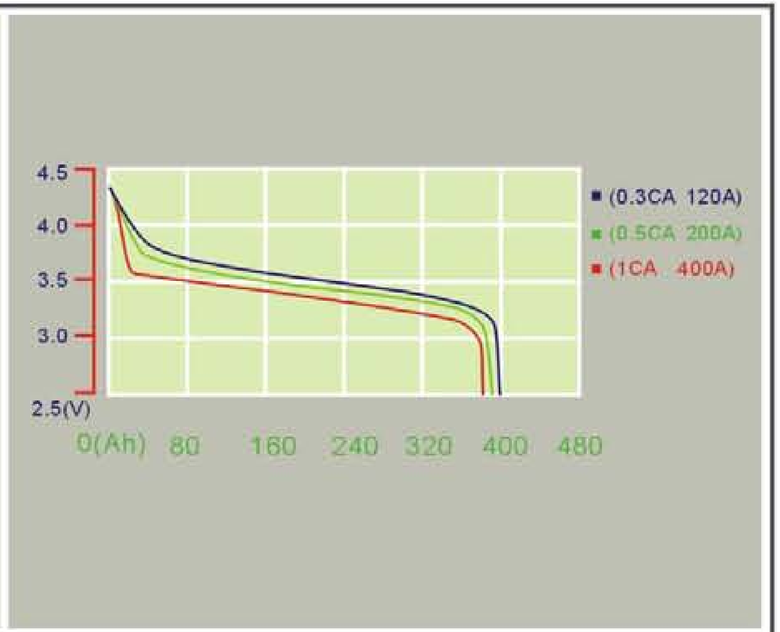


MODEL: TS–LMP400AHA

Nominal capacity	400AH	Operation Voltage	Charge: 4.35V
			Discharge: 2.2V
Max Charge Current	≤1CA	Max Discharge Current	Constant Current ≤ 1CA
			Impulse Current ≤ 10CA
Standard Charge/ Discharge Current	0.3CA	Cycle Life	(80DOD%) ≥ 300Times
			(70DOD%) ≥ 500Times
Temperature Durability Of Case	≤250℃	Operating Temperature	Charge: –25℃~75℃
			Discharge: –25℃~75℃
Self–discharge Rate	≤3%	Weight	13kg ± 150g



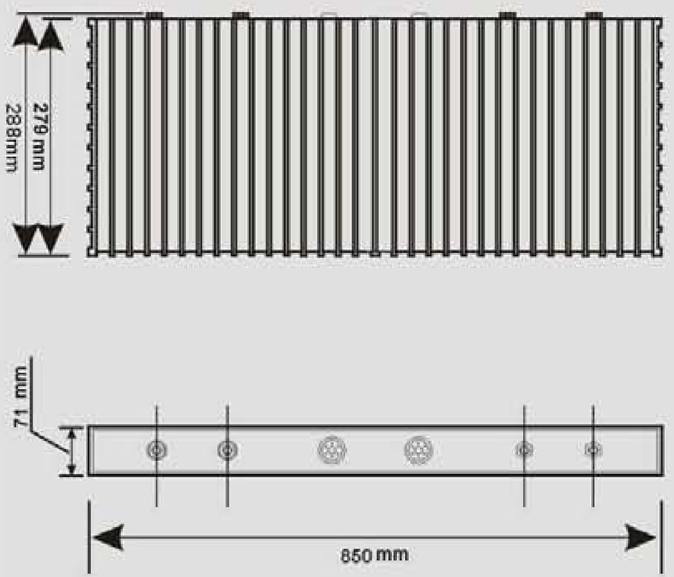
TS–LMP400AHA CHARGE AT TEMPERATURE OF 25℃



TS–LMP400AHA DISCHARGE AT TEMPERATURE OF 25℃

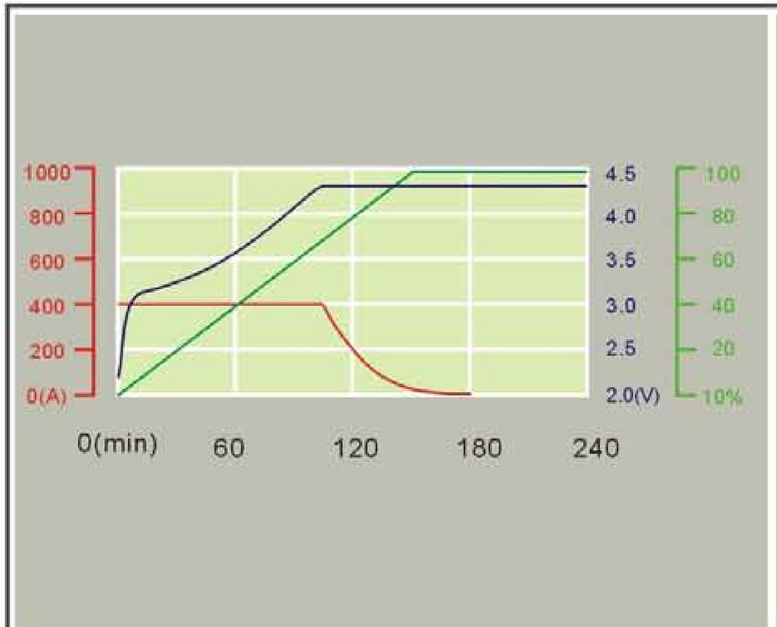
DIMENSIONS

MODEL: TS–LMP800AHA

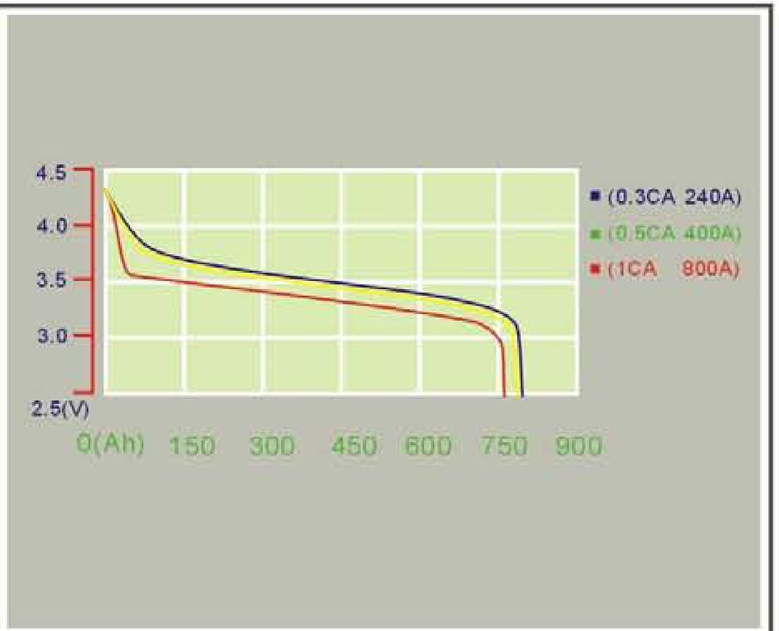


MODEL: TS–LMP800AHA

Nominal capacity	800AH	Operation Voltage	Charge: 4.35V
			Discharge: 2.2V
Max Charge Current	≤0.5CA	Max Discharge Current	Constant Current ≤ 1CA
			Impulse Current ≤10CA
Standard Charge/ Discharge Current	0.3CA	Cycle Life	(80DOD%) ≥ 300Times
			(70DOD%) ≥ 500Times
Temperature Durability Of Case	≤250℃	Operating Temperature	Charge: –25℃~75℃
			Discharge: –25℃~75℃
Self–discharge Rate	≤3%	Weight	25kg ± 300g



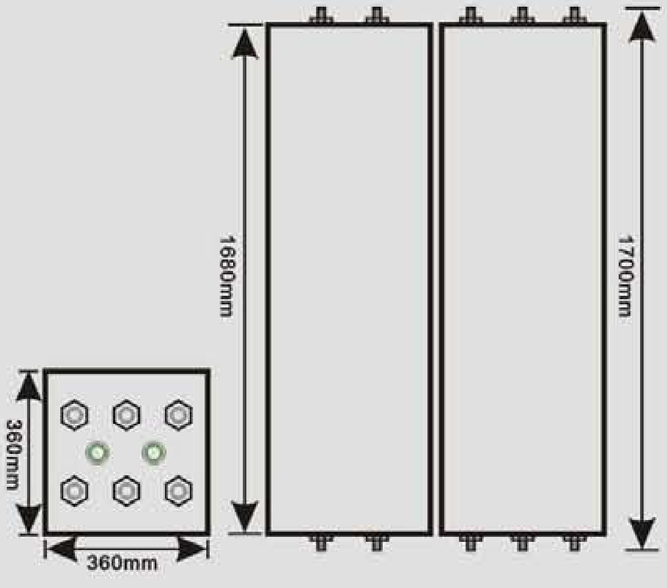
TS–LMP800AHA CHARGE AT TEMPERATURE OF 25℃



TS–LMP800AHA DISCHARGE AT TEMPERATURE OF 25℃

DIMENSIONS

MODEL: TS–LMP9000AHA



MODEL: TS–LMP9000AHA

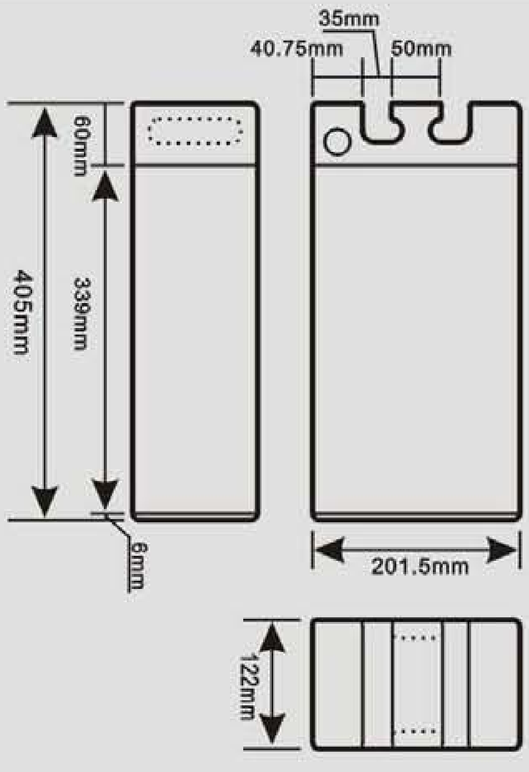
Single cell specifications

■ Nominal Capacity: 9000AH ■ Operating Voltage: 2.2V– – –4.35V ■The impedance of single cell with full capacity at temperature lower than 30℃:≤2.5mΩ ■ Short current of single cell with full capacity at temperature lower than 30℃: approx 80KA ■ Dimension of single cell: **Height :** 1700mm (Net height not include terminal : 1680mm) **Length:** 360mm **Width:** 360mm **Weight:** ≤350KG ± 6KG■Self–Discharging Rate: ≤3% (monthly)

Discharge time	Discharge current	Capacity	Initial voltage	Lowest voltage
1h	9000A	8500Ah	3.9V	2.2V
2h	4500A	9000Ah	4.0V	2.2V
3h	3000A	9000Ah	4.1V	2.2V
4h	2250A	9000Ah	4.1V	2.2V
10h	900A	9000Ah	4.1V	2.2V
20h	450A	9000Ah	4.1V	2.2V
50h	180A	9000Ah	4.1V	2.2V
100h	90A	9000Ah	4.1V	2.2V

DIMENSIONS

MODEL: TS–IF24V40AH

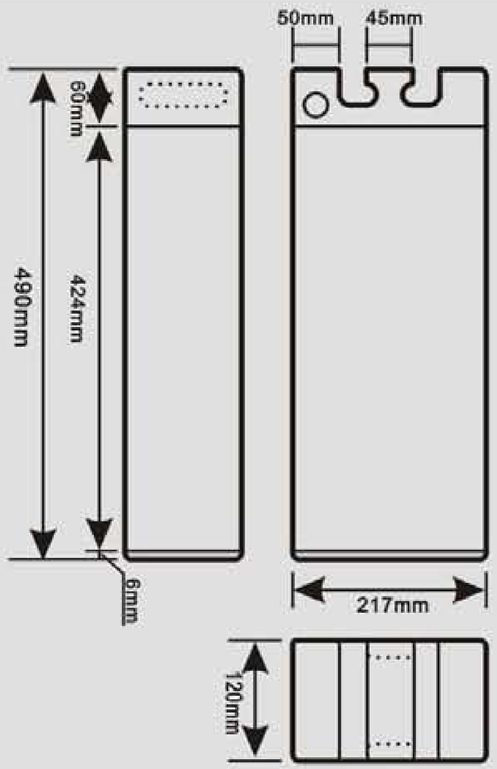


MODEL: TS–IF24V40AH

Operating Voltage	17V~25V	**Nominal Capacity**	40AH
Operating Temperature	–25℃~75℃	**Self–discharge Rate**	⩽ 3%
Standard Output Power	Current ⩽ 15A	**Max Output Power**	Impulse Current ⩽ 150A
	Power ⩽ 300W		Impulse Power ⩽3000W
Standard Charge Mode	10A(cost 3.5h to charge full) With Charger	**Max Charge Current**	(3CA)90A (cost 20 min to charge full) With Charger
Cycle life	80DOD% > 2000Times	**Weight**	⩽ 13kg
	70DOD% > 3000Times		
Shelf Life: Over 10 years			

DIMENSIONS

MODEL: TS–IF24V60AH

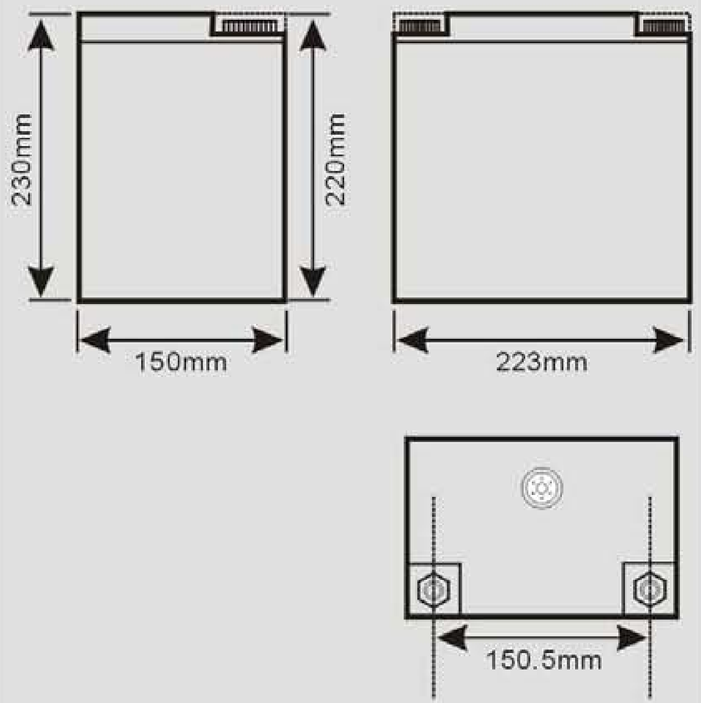


MODEL: TS–IF24V60AH

Operating Voltage	17V~25V	**Nominal Capacity**	60AH
Operating Temperature	–25℃~75℃	**Self–discharge Rate**	⩽ 3%
General Output Power	Current ⩽ 30A Power⩽ 600W	**Max Output Power**	Impulse Current ⩽ 180A Impulse Power ⩽3800W
Standddrd Charge Mode	20A(cost 3.5h to charge full) With Charger	**Max Charge Current**	(3CA)180A (cost 20 min to charge full) With Charger
Cycle life	80DOD% > 2000Times 70DOD% > 3000Times	**Weight**	⩽ 19.5kg
Shelf Life: Over 10 years			

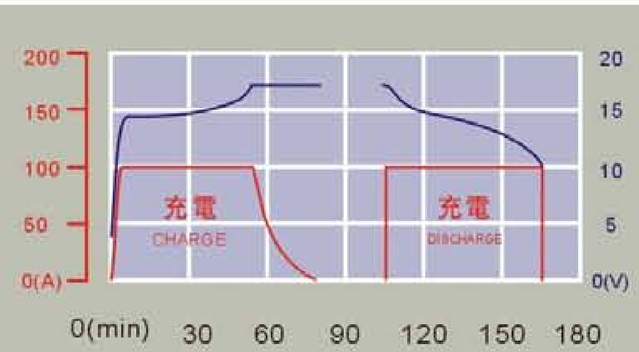
DIMENSIONS

MODEL: TS-LP12V90AH

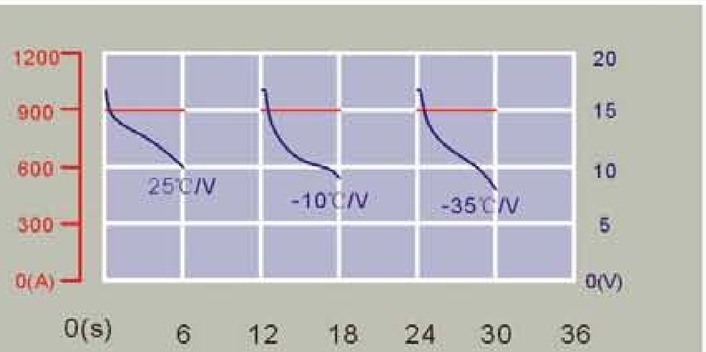


MODEL: TS-LP12V90AH

Nominal Capacity	90AH	**Operation Voltage**	10V–17V
Max Charge Current	**Constant Current** 150A **Impulse Current** (instant) 500A	**Max Discharge Current**	**Constant Current** 150A **Impulse Current** 900A/6S
Temperature Durability of Case	≤250℃	**Operating Temperature**	**Charge** –35℃~75℃ **Discharge** –35℃~75℃
Self-discharge Rate	≤5%	**Weight**	12kg±300g
Durability	3–10 years		



TS–LP12V90AH CHARGE AND DISCHARGE BY 100A AT TEMPERATURE OF 25℃



TS–LP12V90AH IMPULSE DISCHARGE AT DIFFERENT TEMPERATURE

Remark:

This 12V Li–Ion battery is specially designed for fuel car as starting–up power battery. Please connect the battery to the cathode and anode terminal of the 12V lead–acid battery that it replace for.

MATERIAL SAFETY DATA SHEET(form according to EEC Directive 93/112/EC)

NAME: LITHIUM–ION RECHARGABLE BATTERIES

1.IDENTIFICATION (of the product and the supplier)

1.1 Product: None–explosive Rechargeable battery
Trade name and model : LITHIUM–ION POWER BATTERY
Models : TS–LCP , TS–LFP , TS–LMP
Electrochemical system : Lithium , Phosphor , Iron , Fluorine Compound

Electrodes	**Negative electrode** **Carbon/Graphite** **Nano Cellulose**	**Positive electrode** **$LiFCoO_2$** **$LiFFePO_4$** **$LiFNiMnCoO_2$**	**Binder** **SoLvent**
Electrolyte	**Solution of Lithium hexafluorophosphate ($LiPF_6$)** **In a mixture of organic solvents****		
Electrolyte	**3.6 Volts**		

*** Equivalent name: lithiated cobalt oxide.**
**** Ethylene Carbonate (EC) + DiEthyl Carbonate (DMC) + DiEthyl Carbonate (DEC) + Ethyl Acetate (EA).**

1.2 Supplier:
Name : Thunder Sky Battery Ltd.
Address : Thunder Sky Industrial Base,No.3 Industrial Zone,Lisonglang,Village,
Gongming Town, Bao' an Dist, Shenzhen, P.R.C
Phone: + 86 755 86026789 Fax: +86 755 86026678

1.3 Emergency contact:CHEMTREC Phone: 1-800-424-9300

2 – Battery Material Elements and Index

LCP		LFP		LMP	
Chemical Element	Index	Chemical Element	Index	Chemical Element	Index
Fe	0.005%	Fe	42%	Fe	0.1%
Mn	11%	P	16%	Ca	0.3%
Mg	0.7%	Mn	0.5%	PE	3.3%
Co	1%	Ca	0.3%	Ni	1.7%
C	5.1%	Graphite	5%	Mn	18.6%
Li	28%	Na	0.01%	C	5.1%
Cu	10%	C	3.1%	Li	25%
Al	6%	Li	3.4%	Cu	10%
PE	3.3%	PE	3.3%	Al	6%
Graphite	7.1%	Cu	10%	Graphite	6%
Ni	8.1%	Al	6%	PU	3.1%
Lix	9%	Lix	8%	Lix	9%
F	3.1%	F	3.3%	F	3.1%

3 HAZARDS IDENTIFICATION

3.1 Physical :

The Lithium–Ion rechargeable batteries described in this Material Safety Data Sheet are sealed units which are not hazardous when used according to the recommendations of the manufacturer.

Under normal conditions of use, the solid electrode materials and liquid electrolyte they contain are non– reactive provided the battery integrity is maintained and seals remain intact. There is Risk of fire only in cases of abuse (mechanical, thermal, electrical), which leads to the activation of the safety valve and/or the rupture of the battery container. Electrolyte leakage, electrode materials reaction with moisture/water or battery vent/fire may follow, depending upon the circumstances.
In case of excessive internal pressure and/or temperature Thunder Sky batteries are fitted with a safety vent for protection and/or rupture of the cell case.

3.2 Chemical

Substance		Melting point	Boiling point	Classification			
CASNO	Chemical Symbol			Exposure limit	Indication of danger	Special Risk (1)	Safety advices (2)
12190–79–3	$LiFCoO_2$ $LiFFePO_4$ $LiFMn_2O_4$	> 1000 ℃	N/A			R22 R43	S2 S22 S24 S26 S36 S37 S43 S45
EC: 96–49–1 DMC: 616–38–6 DEC: 105–58–8 EA: 141–78–6	Organic solvents (DC–DMC DEC–EA)	EC: 38 ℃ DMC: 4 ℃ DEC:–43 ℃ EA: –84 ℃	EC: 24 ℃ DMC: 90 ℃ DEC: 127 ℃ EA: 77 ℃	None established OSHA	Flammable	R21 R22 R41 R42/43	S2 S24 S26 S36 S37 S45
21324–40–3	$LiPF_6$	N/A(decomposes 160 ℃)	N/A	None established OSHA	Irritant Corrosive	R14 R21 R22 R41 R43	S2 S8 S22 S24 S26 S36 S37 S45

Classification of dangerous substances contained into the product as per directive 67/548/EEC

Safety suggestion

■ Nature of Special risks:

Reacts with water.

Harmful in contact with skin.

Harmful if swallowed.

Risk of serious damage to the eye.

May cause sensitization by inhalation and skin contact.

May cause sensitization by skin contact.

■ Safety advices:

Keep out of reach from children.

Keep away from moisture.

Do not breathe dust.

Avoid contact with skin.

In case of contact with eyes, rinse immediately with plenty of water and seek medical attention.

Wear suitable gloves.

In case of incident, seek medical attention

FIRST AID MEASURES

In case of battery rupture,fume or fire, evacuate personnel from contaminated area and provide maximum ventilation to clean out fumes/gases. Meantime, spray the battery with water or put the smoking battery into basin at once. In all cases, seek medical attention.

Eye contact: Flush with plenty of water (eyelids held open) for at least 15 minutes.
Skin contact : Remove all contaminated clothing and flush affected areas with plenty of Water and soap for at least 15 minutes Do not apply greases or ointments.
Ingestion: Dilute by giving plenty of water and get immediate medical attention. Assure that the victimdoes not aspirate vomited material by use of positional drainage.Assure that mucus does not obstruct the airway. Do not give anything by mouth to an unconscious person.
Inhalation: Remove to fresh air and ventilate he contaminated area. Give oxygen or artificial respiration if needed.

FIRE–FIGHTING MEASURES

Fire and fume hazard: Except LFP series batteries, LCP and LMP batteries can leak and/or spout vaporized or decomposed and combustible electrolyte fumes in case of exposure above 150 ° C resulting from inappropriate use, abuse, or from the environment. Possible formation of hydrogen fluoride (HF) and phosphorous oxides during fire. LiPF 6 salt contained in the electrolyte releases hydrogen fluoride (HF) in contact with water.

Extinguishing media: spray the battery with water or put the smoking battery into basin at once.
Can be used : ····· Type D extinguishers , Co2, Dry chemical or Foam extinguishers
Special hazards : Following cell overheating due to external source or due to improper use, electrolyte leakage or battery container rupture may occur and release inner component/material in the environment.
Eye contact : The electrolyte solution contained in the battery is irritant to ocular tissues.
Skin contact: The electrolyte solution contained in the battery causes skin irritation.
Ingestion: The ingestion of electrolyte solution causes tissue damage to throat and gastro/respiratory tract.
Inhalation : Contents of a leaking or ruptures battery can cause respiratory tract, mucus, membrane irritation and edema.

Special protection: Use self–contained breathing apparatus to avoid breathing irritant fumes.
Wear protective clothing and equipment to prevent body contact with electrolyte solution.

ACCIDENTAL RELEASE MEASURES
The material contained within the batteries would only be expelled under abusive conditions.
Soak under water or spray with copious amounts of water , place in approved container (after cooling if necessary) and dispose in accordance with local regulations.

HANDLING AND STORAGE
The batteries should not be opened, destroyed nor incinerate since they may leak or rupture and release in the environment the ingredients they contain. .

Handling: Do not crush, pierce, short (+) and (–) battery terminals with conductive (i.e. metal) goods.
Do not directly heat or solder. Do not throw into fire. Do not mix batteries of different types and brands.
Do not mix new and used batteries. Keep batteries in non–conductive (i.e. plastic) trays.

Storage: Store in a cool (preferably below 30 ° C) and ventilated area away from moisture, sources of heat, open flames, food and drink. Keep adequate clearance between walls and batteries. Temperature above 100 ° C may result in battery leakage and rupture. Since short circuit can cause burn, leakage and battery container rupture hazard, keep batteries in original packaging until use and do not jumble them.

Other: Follow manufacturer recommendations regarding maximum recommended currents and operating temperature range.

Applying pressure or deforming the battery may lead to the rupture of battery container and disassembly followed by eye, skin and throat irritation.

FIRE CONTROLS/PERSONAL PROTECTION
Respiratory protection: Not necessary under normal use. In case of battery rupture, use self– contained full–face respiratory equipment.

Hand protection: Not necessary under normal use. Use Viton rubber gloves if handling a leaking battery.
Eye protection: Not necessary under normal use. Wear safety goggles or glasses with side shields if handling a leaking or ruptured battery.
Skin protection: Not necessary under normal use. Use rubber apron and protective working in case of handling of a ruptured battery.

PHYSICAL AND CHEMICAL PROPERTIES

Appearance : (Physical shape and color as supplied)White Plastic Prismatic cases with ribs, hermetically sealed and fitted with a metallic terminals/connections.

Temperature range :

	Continuous	Occasional
In storage during	+ 30 ℃ max	-30/+ 80 ℃
discharge during	30/+ 80 ℃	-30/+ 80 ℃
during charge	0/+ 75 ℃	0/+ 75 ℃

Specific energy: (Note: Wh = Normal voltage x Rated Ah) kg = Average battery weight)

Specific pulse power: 600w–1200w/kg Varies depending upon size

Mechanical resistance : As defined in relevant IEC standard

STABILITY AND REACTIVITY

Conditions to avoid : Heat above80 ° C or incinerate. Deform, mutilate, crush, pierce, disassemble. Short circuit. Prolonged exposure to humid conditions.

Materials to avoid : N/A

Hazardous decomposition products: Corrosive/Irritant Hydrogen fluoride (HF) is produced in case of reaction of lithium hexafluorophosphate (LiPF 6) with water. Combustible vapors and formation of Hydrogen fluoride (HF) and phosphorous oxides during fire.

TOXOLOGICAL INFORMATION
Thunder Sky Battery Ltd. Lithium–Ion rechargeable batteries do not contain toxic materials.

ECOLOGICAL INFORMATION
When properly used or disposed, Thunder Sky Battery Ltd Lithium–Ion rechargeable batteries can be recycled and do not present environmental hazard during their life time.

DISPOSAL CONSIDERATIONS
Dispose in accordance with applicable regulations, which vary from country to country.

Lithium–Ion batteries should have their terminals insulated and be preferably wrapped in individual plastic bags prior to disposal.

Incineration :
Incineration should never be performed by battery users but eventually be trained professionals in authorized facilities with proper gas and fumes treatment.

Recycling : Send to authorized recycling facilities.

TRANSPORT INFORMATION

United Nations : UN ° 3090 Classification 9 Packaging ICAO 903 for Air Transport IMDG 903 for Sea Transport

Internations conventions :

Air	IATA	Yes
Sea	IMDG	Yes
Land	ADR (road)	Yes
	RID (rail)	Yes

Other : In the USA : Code of Federal Regulations (49 CFR Ch. 1 § 173–185)

REGULATION INFORMATION

The transport of rechargeable lithium–ion batteries is regulated by various bodies (IATA, IMO, ADR, US– DOT) that follow the United Nations " Recommendations on the Transport of Dangerous Goods, Model Regulations, 13 th Revised edition–2003– Ref. STSG/AC.10/1 Rev. 13 " Depending on their lithium metal equivalent weight content, design, and ability to pass safety tests defined by the UN in the " Recommendations on the Transport of Dangerous Goods–Manual of Tests and Criteria– 3 rd Revised edition – 2002–Ref. Ref. STSG/AC.10/11 Rev. 3 Amendment 1 <> " , the lithium–ion cells and the battery packs may or may not be assigned to the UN No 3090 Class–9, that is restricted for transport.

Individual lithium–ion cells and battery packs with respectively less than 1.5 and 8 grams of equivalent Lithium metal content that pass the UN–defined safety tests, are not restricted for transport (1.0 Ah of declared nominal capacity = 0.3 gram of Li equivalent weight content).

Thunder Sky
Battery Limited

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