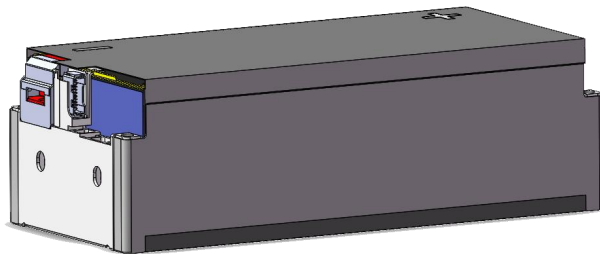


模组产品规格书

Module Product Specification



MC1401-44.04V58A(NCM58Ah1P12S)

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目录

1.适用范围 Scope	4
2.术语定义 Definition of Terms	4
3.模组参数 Module Parameter	5
3.1. 电池模组性能指标 Cell Technical Parameter	5
3.2. 电池模组性能指标 Module Technical Parameter	6
3.3 模组尺寸 Module Dimension	7
4.外观要求 Appearance Requirements	9
5.电气性能规格及要求 Electrical Performance and Requirements	9
5.1 低压接口 Low voltage interface	9
5.2.模组高压接口 Module high voltage interface	10
5.3.模组机械接口 Module mechanical interface	10
6.标识、包装、运输 Identification, Package, Transportation, Storage	11
6.1. 标识 Identification	11
6.2.包装 Package	11
6.3. 运输 Transportation	11
6.4. 存储 Storage	12
6.5. 安装 Installation	12
7.风险警告 Warning	15
7.1. 警示声明 Warning Statement	15
7.2. 危险类型 Dangerous Type	15

1.适用范围 Scope

本规格书规定了 LS 公司设计生产的商用类电动汽车动力用蓄电池模块的术语定义、成组功能和指标、试验方法、检验规则及标志、包装、运输、贮存等要求。

This specification specifies the definition of terms, grouping functions and indicators, test methods, inspection rules and requirements for marking, packaging, transportation and storage of battery modules designed and manufactured by LS for powering commercial class electric vehicles.

本规格书适用于可充电动力蓄电池模块。

This specification applies to rechargeable power battery modules.

2.术语定义 Definition of Terms

Terms	Definition
产品 Product	本规格书中的“产品”是指 LS 生产的 58Ah 蓄电池模块。 The “Product” in this specification refers to the 58Ah battery module manufactured by LS.
蓄电池模块 Battery module	将一个以上单体蓄电池按照串联、并联或串并联方式组合，且只有一对正负极输出端子，并作为电源使用的组合体。 Means a combination that use as power source of more than one cell in series, in parallel, or in series and in parallel with only one pair of negative and positive output terminals.
周围环境温度 Ambient Temperature	电芯所处的周围环境温度的测量值。温度公差为 $\pm 2^{\circ}\text{C}$ 。 Means the ambient air temperature of the environment to which products are exposed, and temperature tolerance is $\pm 2^{\circ}\text{C}$.
电芯温度 Cell Temperature	由接入电芯的温度传感器测量的电芯温度，温度传感器和测量线路的选择由 LS 和客户共同商定。 Means the temperature of product as measured by a thermal sensor to be selected and installed by client in close proximity of product in use.
C 率电流 C-rate current	充放电电流与多次测量得到的电池容量值的比率。例如：电池容量为 100Ah，充电电流为 20A 时，则 C 率为 0.2C。 Means the ratio of the charge and discharge current to the capacity value obtained from multiple measurements, for example, when the battery capacity is 100Ah and the charging current is 20A, the C-rate is 0.2C.
Cycle 循环 Cycle	电池按规定的充放电标准(1/3C)连续充电一次，连续放电一次为一个循环。在充电过程中只有正常充电或极短时的再生充电的情况；放电可以由一些部分放电组合在一起形成。 Means the battery continuously charged and discharged once according to

	the specified charging and discharging standards is one cycle, only normal charge or very short regenerative charge in the charging process, discharge can be composed of some partial discharges.
开路电压 Open circuit voltage	没有接入任何负载和电路时测得的电池的电压。 Means measure the battery voltage with no load and connected circuit.
蓄电池模块额定容量 Nominal capacity	室温下完全充电的蓄电池以 1/3C 电流放电, 达到终止电压时所放出的容量 (Ah) 。 Means the released capacity (Ah) when the traction battery discharged at a current of 1C until the discharge termination condition specified by LS after fully charged at room temperature.
蓄电池模块额定能量 Nominal energy	室温下完全充电的蓄电池以 1/3C 电流放电, 达到终止电压时所放出的能量 (Wh) 。 Means the released energy (Wh) when the traction battery discharged at a current of 1C until the discharge termination condition specified by LS after fully charged at room temperature.
蓄电池模块初始容量 Initial capacity	新出厂的蓄电池, 在室温下, 完全充电后, 以 0.5C 电流放电至企业规定的放电终止条件时所放出的容量 (Ah) 。 The capacity (Ah) released by a newly manufactured battery when fully charged at room temperature and discharged at 0.5C current to the discharge termination condition specified by the enterprise.
容量恢复能力 Recoverable capacity	完全充电的蓄电池在一定的温度下储存一定时间后, 再完全充电, 其后放电容量与初始容量之比。 The fully charged battery fully charged again after being stored at the certain temperature for a certain period of time, and thereafter the ratio of discharged capacity to the initial capacity.
新电芯状态 Fresh battery status	指电芯自产品生产日期算起, 7天以内的状态。 Means the status of the battery is calculated within 7days from the date of manufacture of the product.

3.模组参数 Module Parameter

3.1. 电池电芯性能指标 Cell Technical Parameter

电芯技术参数 (58Ah)

Cell technical parameters (58Ah)

序号 No.	项目 Item	规格/参数 Specification/Parameter	备注 Note
1	电芯类型 Cell type	NCM	
2	电芯型号 Cell model	C1-NCM58W	
3	额定容量(Ah)	58	25°C, 1/3C discharge, Fresh battery

序号 No.	项目 Item	规格/参数 Specification/Parameter	备注 Note
	Nominal capacity (Ah)		
4	标称电压(V) Nominal voltage (V)	3.67	@1C
5	工作电压范围(V) Operating voltage(V)	2.75-4.35 2.2-4.35	T≥0℃ -30℃≤T<0℃
6	单体电芯重量(kg) Cell weight(kg)	0.926±0.02	Average weight
7	单体电芯尺寸(mm) Cell dimension(mm)	(26.66±0.15) * (148.24±0.15)* (105.9±0.2)	100±10kgf
8	标准充放电(A) Standard charge/discharge	1C/1C	25℃
9	最大持续充/放电倍率 Maximum continuous charge/discharge C-rate	1C/1C	25℃
10	循环寿命 (次, 非工况) Cycle life (times, non-operating conditions)	2000 times (25℃)	a)At room temperature, charged to 4.3V at a step charge (1.2C CC 3.87V, 0.85C CC 4.1V, 0.33C CC 4.3V) , and then, changed continuously with constant voltage of 4.3V until the current was not more than 2.9±0.5A b) Discharged at 58A to the cut-off voltage 2.75V at room temperature c) Repeating steps of a) ~ b), until the discharge capacity reached the 80% of rated capacity, the number of cycles completed was defined as the battery cycle life.
11	工作温度范围(℃) Operating temperature(℃)	discharge: -30 ~ 55℃	
		charge: -20 ~ 55℃	
12	推荐储存温度范围(℃) Recommend Storage temperature(℃)	15 ~ 35℃	

3.2. 电池模组性能指标 Module Technical Parameter

电池模组技术参数 (NCM)
Module technical parameters (NCM)

序号 No.	项目 Items		规格/参数 Specification/Parameter	备注 Note
			58Ah1P12S	
1	标称电压(V) Nominal voltage(V)		44.04	
2	工作电压范围(V) Operating voltage(V)	min	52.2	Corresponding single cell voltage 2.75~4.35V@0°C≤T≤55°C 2.2~4.35V@-30°C≤T<0°C
		max	33 26.4	
3	额定容量(Ah) Nominal capacity(Ah)		≥58±3%	25°C, 1C Discharge, Fresh battery
4	能量 (KWh) Nominal energy (KWh)		≥2.55±3%	25°C, 1C Discharge, Fresh battery
5	成组方式 Group mode		1P12S	Serial and parallel schemes
6	寿命终止剩余容量(Ah) End of life residual capacity (Ah)		46.4	residual capacity≥80% initial capacity, @25°C
7	最大脉冲充电功率 (≤10s) (KW)) Maximum short pulse (regeneration) charge power (≤10s) (KW)		7.7	25±2°C, 50%SOC
8	持续放电功率 (KW) Continuous discharge power (A)		2.55	25±2°C
9	最大脉冲放电功率 (≤10s) (KW)Maximum short pulse disc harge power (≤10s) (KW)		13.2	25±2°C, 50%SOC
10	推荐 SOC 工作范围 (%) Recommend SOC operating range (%)		5%~97%	
11	模组冷却方式 Module cooling method		Natural cooling	
12	模组加热方式 Module heating method		No	
13	出货时荷电量(SOC) Shipping capacity (SOC)		≈30%	SOC is consistency in the same batch
14	标准储存温度 Standard storage temperature		-20°C ~ 25°C	

3.3 模组尺寸 Module Dimension

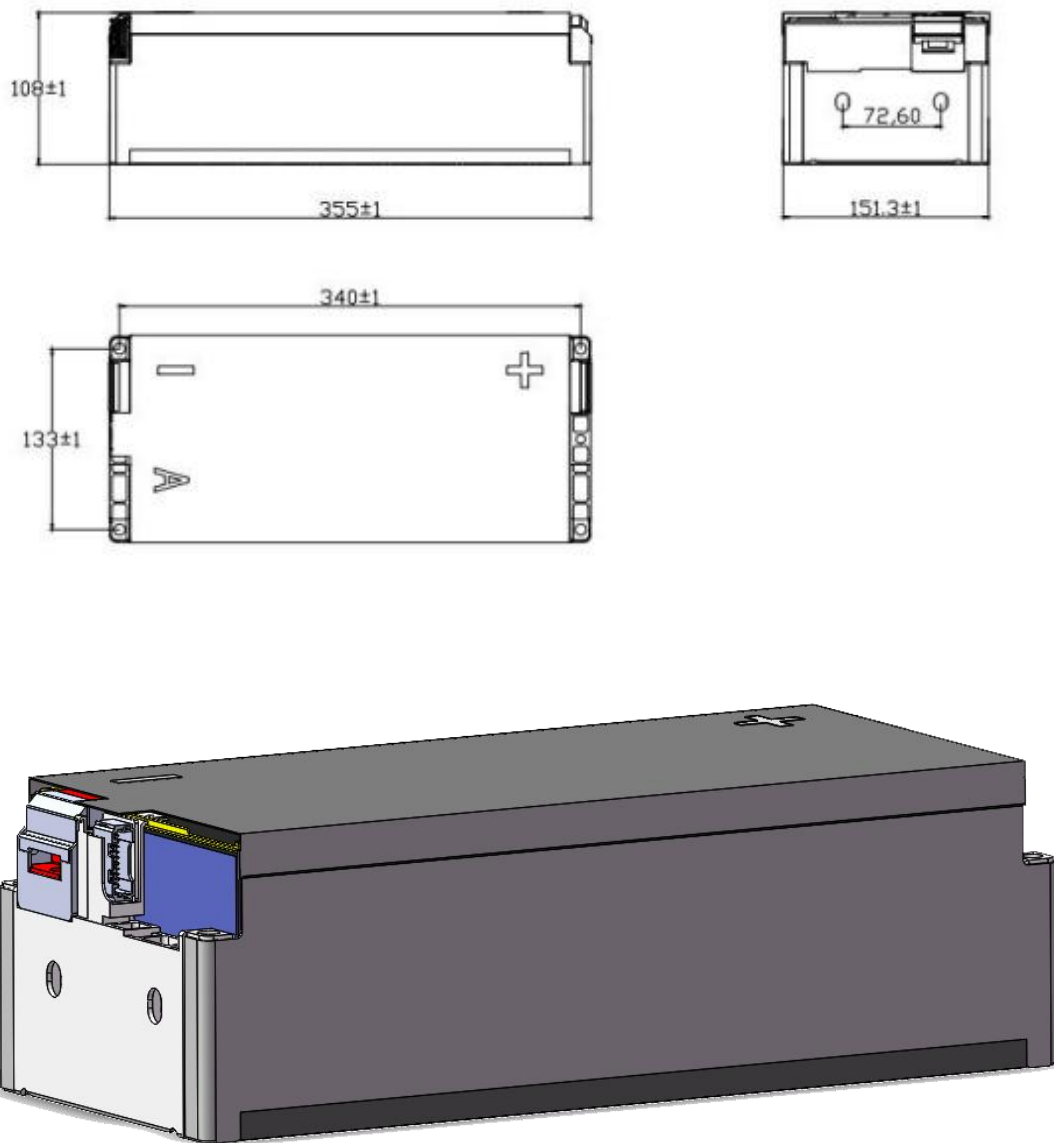


图 1 模组尺寸
Figure 1 Dimension of module

4.外观要求 Appearance Requirements

模组装配完成后结构牢固可靠，无松垮、倾斜；

The structure of the module is firm and reliable after completely assembly without any looseness and tilt.

正、负出线端须贴有明显永久性正负极标识，外露高压部件有防护措施；

The positive and negative outlets must be marked with permanent positive and negative labels, and the exposed high-voltage components should have protective measures.

各结构与控制件应安装正确，完整，连接可靠，无松动，无机械损伤；

Each structure and control part should be installed correctly, completed, reliable connected, no looseness, no mechanical damage.

电池单体无漏液、鼓包、表面无锈蚀、霉斑等现象；

The cell should be without leakage and bulging, no rust and mildew on the surface, etc.

采集线束焊接可靠，走线整齐，可靠固定，接口连接器拆装方便

Acquisition harness welding is reliable, alignment is neat and reliable, and interface connector is easy disassemble and install.

5. 电气性能规格及要求 Electrical Performance and Requirements

5.1 低压接口 Low voltage interface

模组包含低压接口。低压接口连接时，应要求相应的连接器与其匹配，并检查低压连接器是否清洁、无杂质等，确保没有金属屑落入连接器中。允许连接器操作次数：≤10 次

Module consists of low voltage interface. When low voltage interface connection, the corresponding connector shall be required to match with it, and check whether the low voltage connector is clean, free of foil, etc. and ensure there is no metal power falls into the connector.

Allowable connector operation times: ≤10

插头接插件型号: IMSA-13065B-2-20A-TR

Male connector type: IMSA-13065B-2-20A-TR

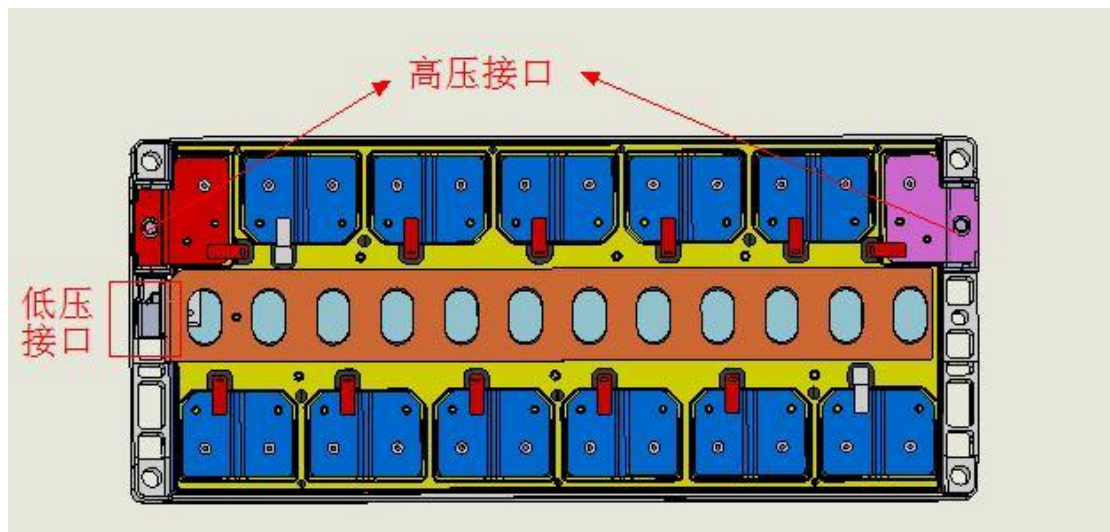
1	/
2	V3
3	V7
4	V11
5	NTC2+
6	V2
7	NTC1+
8	V6
9	V10

10	PWR
11	/
12	V1
13	V5
14	V9
15	NTC2-
16	V0/GND
17	NTC1-
18	V4
19	V8
20	V12

5.2. 模组高压接口 Module high voltage interface

模组高压接口处预置 M6 嵌装螺母，通过该嵌装螺母固定主电极导电排与模组间连接，实现模组与外部的高压连接。

The M6 embedded nut is preset at the high-voltage interface of the module, and the connecting wire between the main electrode conducting bar and the module is fixed by the embedded nut to realize the high-voltage connection between the module and the outside.



5.3. 模组机械接口 Module mechanical interface

模组端板中预置通孔作为其与箱体连接的机械接口，安装孔尺寸请参见模组外形尺寸图。

The preset through-hole in the end plate of the module is used as the mechanical interface for the connection between the hole and the box. For the size of the mounting hole, please refer to Fig. Module Overall Dimension Diagram.

推荐采用在箱体底部设置焊接螺母，通过长螺栓穿过安装通孔的方式将模组与箱体

固定；推荐在模组上端部增加固定板将各模组之间互相连接，增强箱体整体刚度。

It is recommended to set the welding nut at the bottom of the box, and fix the module and the box through the way of the long bolt passing through the installation through-hole; It is recommended to add a fixed plate at the upper end of the module to connect the modules to enhance the overall stiffness of the box.

6.标识、包装、运输 Identification, Package, Transportation, Storage

6.1. 标识 Identification

蓄电池模块应标识极性，极性识别标记应位于接近端子柱的位置，采用下列标识符：

The battery module should be marked with polarity, the polarity identification should be located near the terminal post, adopting to the following identifier:

正极端子——用符号 “+” 或文字 “正极” ；

Positive terminal——use symbol “+” or text ‘Positive’

负极端子——用符号 “-” 或文字 “负极” 。

Negative terminal——use symbol “-” or text ‘Negative’

6.2. 包装 Package

包装箱应考虑防潮、防振、防尘要求。

The requirements of moisture, vibration, dustproof of packing box should be with consideration.

包装箱应牢固，产品在箱内不应窜动，以免运输途中损伤。

The packing box should be firm and the product should not be moved in the box so as to avoid the damage during transportation.

6.3. 运输 Transportation

蓄电池模组应在不完全放电状态下运输。剩余电量根据运输时间和自放电率确定，剩余电量不应小于 20%。

The battery module should be transported in incomplete discharge state, the residual power that should not less than 20% is determined according to the time of transportation and the self-discharge rate.

在运输过程中，应防止剧烈振动、冲击、日晒、雨淋，且需配备可灭 E 类火的二氧化碳灭火器等消防设备。

Severe vibration, impact, sun exposure, and rain should be prevented in the process of transportation, and need to equip with fire extinguishers such as carbon dioxide extinguishers capable of destroying class fire of E .

6.4. 存储 Storage

蓄电池模组应在温度为 10°C ~ 35°C，通风、清洁、干燥的室内储存。避免阳光直射，距离热源不应少于 2m。

The battery module should be stored in a ventilated, clean, dry room at a temperature of 10°C ~ 35°C , avoid direct sunlight, the distance from the heat source should be not less than 2m.

蓄电池模组储存期间，剩余电量应小于 60%，大于 40%。

Residual energy of battery module should be in the range of 40%- 60% during the storage.

蓄电池模组不应倒置或卧放，并应避免机械冲击或重压。The battery module should not be inverted and laid, and should avoid mechanical impact and heavy pressure.

储存湿度：≤95%RH，推荐 10%~85%RH。

Storage humidity: ≤95%RH, 10%~85%RH is recommended.

储存环境：产品应储存在清洁、通风的房间内，不得暴露在阳光、高温、腐蚀性气体、振动、冲击和其他气候和机械负荷下。将模块放置在远离热源的地方。储存海拔高度应小于 1500m，压力 86kPa~106kPa。允许储存时间根据 SOC 和自放电率确定，SOC≤5%是不允许的。

Storage environment: product shall be storage in a clean, ventilated room without exposure to sunlight, high temperature, corrosive gas, vibration, impact and other climate and mechanical loadings. Put modules far away from heat source. Storage altitude should be less than 1500m with pressure 86kPa~106kPa. Allowable storage time shall be determined according to SOC and self-discharge rate, SOC≤5% is not allowed.

如果确定产品可以存放 6 个月以上，则存放 6 个月以上后应测试电芯电压。

If it is determined that the product can be stored for more than 6 months, the battery cell voltage

shall be tested after storage for more than 6 months.

储存过程中的测试方法如下：在室温下，对低于储存 SOC 要求的产品进行充放电过程，充放电率 $\leq 1C$ ，充电后将 SOC 调整在 40%~60%之间；在实际运行过程中，根据出货的 SOC 和自放电情况，双方就补货策略达成一致。

Test methods during storage are as follows: At room temperature, make a charge/discharge process for product below the storage SOC requirement, charge/discharge rate $\leq 1C$, adjust SOC between 40%~60% after charge; During the actual operation, according to the shipped SOC and self-discharge conditions, both parties agree on the replenishment strategy.

6.5. 安装 Installation

确保模块与模块之间以及模块与电池组外壳之间有足够的安全距离。

Ensure that there is sufficient safety distance between the module and module, and between the module and the Pack housing.

模块在外壳上安装的平整度要求：为保证安装可靠，模块在外壳上的安装，模块在外壳上的安装平面度应 $\leq 0.5mm$ 。

Flatness requirements for the module installation on the housing: in order to ensure reliable installation of the module on the housing, the module installation flatness on the housing shall be $\leq 0.5mm$.

模块顶盖不允许受力。

The top cover of the module does not allow force.

模块底部安装要求。

安装模块时，轻拿轻放，避免底部划伤。

Installation requirements of module bottom .

When installing the module, handle it gently to avoid scratches on the bottom.

模块之间的安装间隙要求。Pack 中的模块应预留足够的安装和维护空间。一般相邻端板安装间隙 $\geq 20mm$ ，相邻侧板安装间隙 $\geq 5mm$ 。

Requirements for installation clearance between modules. Enough installation and maintenance space shall be reserved for the module in the Pack. Generally, the installation clearance of adjacent end plate shall be $\geq 20mm$, and the clearance of adjacent side plate shall be $\geq 5mm$.

模块连接要求。模块上有两个接口：正负电源接口，通讯接口。系统工作在高电压、大电流的条件下，接

口连接必须安全可靠。

Module connection requirement. There are two interfaces on the module: positive/negative power interface, communication interface. The system works under the condition of high voltage and large current, so the interface shall be connected in safe and reliable way.

连接电缆应满足最大连续充放电电流的使用要求。所有连接器必须安全可靠，确保不会出现松动或接触不良，接近零接触电阻，连接器必须耐腐蚀、耐磨、抗振。所有连接必须符合相关标准的要求，并严格防止电弧放电；在连接过程中防止任何形式的短路；Pack 内的所有电源连接部件必须有足够的绝缘保护。

The connection cable shall meet the use requirements of the maximum continuous charge/discharge current. All connectors must be safe and reliable to ensure that there will be no loose or poor contact, close to zero contact resistor, and the connector must be corrosion-resistant, wear resistant and vibration resistant. All connection must meet the requirements of the relevant standards and strictly prevent arc discharge; Prevent any form of short circuit during connection; All the power connection parts inside the Pack must be provided with sufficient insulation protection.

确保电池正负极不接触外壳造成漏液和短路的措施，任何时候都绝对保证电池正负极直接短路，否则可能造成事故。严禁操作人员使用 不佩戴防护用品进行操作；连接要点：确保连接正确可靠（不松动），全程接触良好，不短路；连接完成后，必须逐点测量确认；所有连接点必须与外壳或其他部件无接触和短路；任何其他不确定因素，请在实施前请专业人员确认。

Measures to ensure that battery positive/negative will not contact the external housing to cause leakage and short circuit, and absolutely ensure that the battery positive/negative be directly short circuit at any time, otherwise it may cause accidents. It is strictly prohibited for operators to operate without wearing protective equipment; The key point of connection: ensure correct and reliable connection (no loosening), good contact and no short circuit in the whole process; After the connection is completed, it must be measured and confirmed point by point; All connection points must be free from contact and short circuit with external housing or other parts; Any other uncertain factors, please confirmed by professionals before implementation.

7. 风险警告 Warning

7.1. 警示声明 Warning Statement

电池存在潜在的危险，在操作和维护时必须采取适当的防护措施！

The battery has potential dangerous, and proper protective measures should be taken during operation and maintenance.

不正确地操作本规格书，可能导致严重的人身伤害和财产损失！

Improper operation of this specification may result in serious personal injury and property damage.

必须使用正确的工具和防护装备操作电池！

It is strictly required to use correct tools and protective equipment when operating the battery.

电池的维护必须由具有电池专业知识并经过安全培训的人士执行！

The maintenance of battery must be performed by someone who has battery expertise and battery safety training experience.

不遵守上述警告可能造成多种灾难！

Multiple disaster may occur without complying the warning above.

7.2. 危险类型 Dangerous Type

客户应知悉电池使用和操作过程中存在以下潜在的危险:

Clients should be aware of following potential danger in the process of using and operating battery:

操作者在操作时可能会受到化学品、电击或者电弧的伤害。尽管人体对遭受直流电与交流电的反应不同，但是高于 50V 的直流电与交流电对人体的伤害是同样严重的，因此客户必须在操作中采取合理的保护措施以避免电流的伤害。

The operator may be exposed to chemicals, electric shock or arcing during operation. Although the human body responds differently to direct and alternative currents, direct and alternative current more than 50V hurt the human body similarly, therefore, client must take reasonable protective measures during operation to avoid current damage

存在来自电池中电解液的化学危害风险。

There is a risk of chemical hazards from the electrolytes in the battery.

客户及其雇员在操作电池和选择个人防护装备时，必须考虑到以上潜在的风险，防止发生意外短路，造成电弧、爆炸或热失控。

Client and employee must consider the risks above when operating the battery and selecting personal protective equipment to avoid accidental short circuits, causing arcs, explosions or thermal runaway.