产品规格书

Product Specification

产品名称：储能锂电池

产品型号：TPW-51.2V100Ah-E

产品规格：51.2V100Ah

编制日期：2022.12.1

文件编号 File. NO：	版本 Version： A.0	
制定 Draft	审核 Checked	批准 Approval
李梦光	成胜祥	吴怡芳
客户回签 Customer Approval		

目录

Content

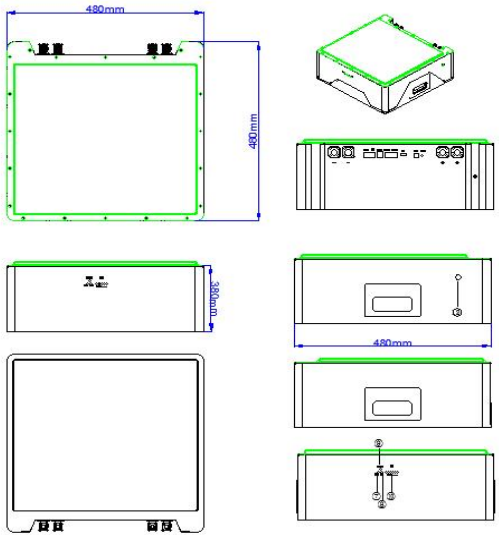
1. 适用范围 Application Scope

本规格书规定了48V400A 48V400Ah磷酸铁锂可充电电池组(以下简称电池组)的基本性能、技 术要求、测试方法及注意事项。本规格书只适用于深圳市拓普威新能源有限公司所生产的电池组.

This specification defines the basic performance, technical requirement, test methods and matters needing attention of 48V400A 48V400Ah LiFePO4 cylindrical rechargeable battery pack (hereinafter referred to as battery pack). This specification applies only to battery pack of **Shenzhen Topway New Energy Co., Ltd**

2.1 尺寸示意图 Size Diagram

外形尺寸 Outline Size



项目 Item	描述 Description	尺寸 Dimension	项目 Item	描述 Description	尺寸 Dimension
H	厚度 Thickness	380± 2mm	充放电端	储能 600V120A 单芯连接器	红正黑负
W	宽度 Width	480±2mm	检修口	无	无
L	长度 Length	480±2mm	通讯	双 RS485+232+CAN	无

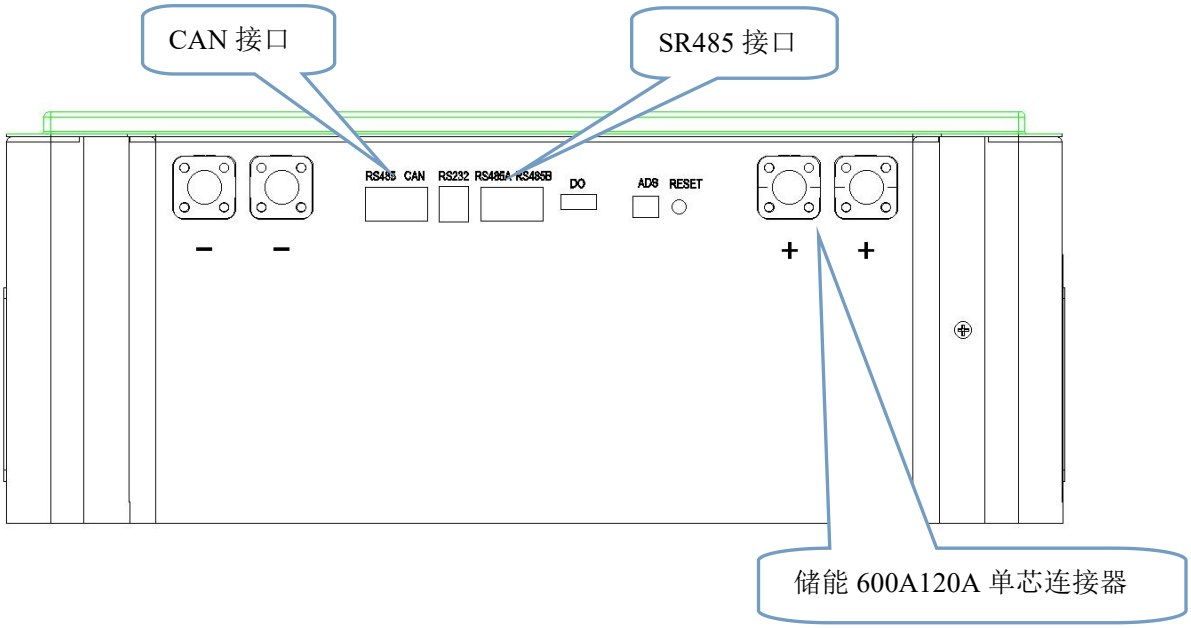
备注 1：以上图示仅为电池组外部尺寸。
Remark 1：All the dimension show above is outside size of battery Pack.

备注 2：电池组厚度、宽度、长度测量时，测量仪器作用于电池组上的压力应大于 300gf。
Remark 2：When measuring the battery pack's thickness, width and length, the stress of the measuring instrument on the battery pack should be larger than 300gf.

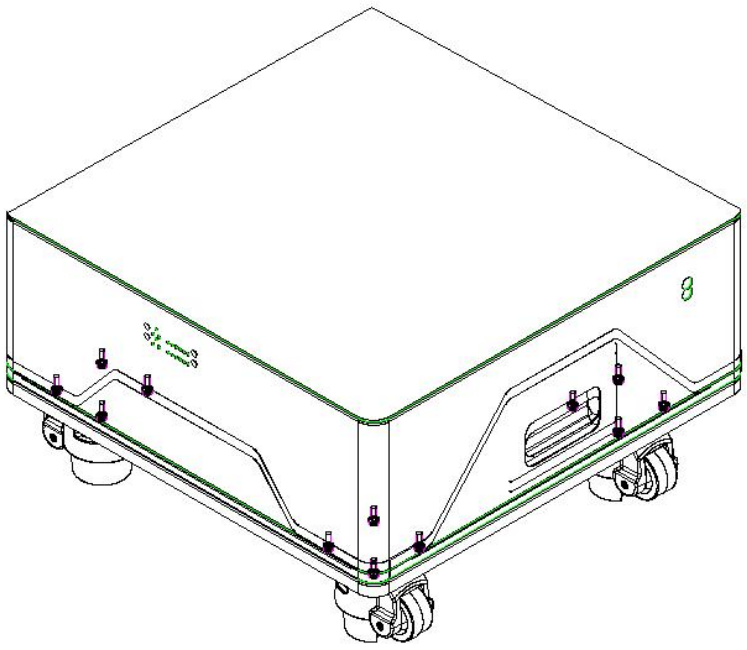
2.2 接口 Connector

充电接口/ 放电接口：五金触点

Interface: charging interface/discharge Metal contact red and black



2.3 *实物图 Product photo*



3. 技术参数明细 Characteristic(@25℃)

序号 No.	项目 Item	单位 Unit	特征值 Value	备注 Remark
3.1 基本特性 Basic Characteristic				
01	电芯型号 Cell model	-	47173120-100Ah	LiFePO4
02	组合方式 Combination Mode	-	16S1P	
03	标称容量 Nominal Capacity	Ah	100	0.5C 充 0.5C 放（环境温度 25℃±2）
04	最小容量 Minimum Capacity	Ah	95	
05	额定电压 Rated Voltage	V	51.2	
06	充电截止电压 Charge Ending Voltage	V	58.4	可设
07	放电截止电压 Discharge Ending Voltage	V	40	可设
08	标准充电电流 Standard Charge Current	A	10	
09	最大充电电流 Max. Charge Current	A	20	
10	标准放电电流 Standard Discharge Current	A	50	
11	最大持续放电电流 Max Continuous Discharge Current	A	100	
12	循环寿命 Cycle Life	次	≥ 6000times/25℃/0.25C	
13	外壳类型 Shell type	-	钣金箱体 /SPCC	
14	重量/Weight	kg	≈55	
15	工作温度 Operating Temperature	℃	0~+45℃	充电 Charge
			-10~ +60℃	放电 Discharge

16	出厂电压/Delivery Voltage	V	40-54	
	3.2 保护板特性 PCM Characteristic			
01	过充保护电压 Over Charge Protect Voltage	V	3.65	单串保护 Single Series
02	过充保护延迟时间 Over Charge Protect Delay Time	mS	1000± 500	
03	过充保护解除条件 Over Charge Release Condition	-	放电 Discharge	
04	过放保护电压 Over Discharge Protect Voltage	V	2.5	单串保护 Single Series
05	过放保护延迟时间 Over Discharge Protect Delay Time	mS	100± 50	
06	过放保护解除条件 Over Discharge Release Condition	-	充电 Charge	
07	放电过流保护电流 Discharge Over Current Protect	A	300	可设
08	放电过流保护延迟时间 Discharge Over Current Delay Time	mS	≤10±5	
09	放电过流解除条件 Discharge Over Current Release Condition	-	断开负载 Release From Load	
10	短路保护条件 Short Circuit Protect Condition	-	电池组外部短路 External Short Circuit	
11	短路保护延迟时间 Short Circuit Protect Delay Time	uS	≤600	
12	短路保护解除条件 Short Circuit Protect Release Condition	-	断开负载 /充电 Release From Load/ Charge	
13	均衡开启电压 Equalization Start Voltage	V	3.4	
14	均衡电流 Equalizing Current	mA	45	
15	高温保护 High Temperature Protect	℃	65	
16	低温保护 Low Temperature Protect	℃	-20	

4、测试要求 Test Requirement

4.1 标准测试条件 Standard test condition

待测电池组必须是本公司出厂时间不超过一个月的新电池组，且未进行过五次以上充放电循环。除非另有规定，本规格书中的各项测试应在以下条件下进行：

Battery Pack to be tested should be new battery pack within one month after shipment from our factory and the battery pack should not be cycled more than five times before the test. Unless otherwise specified, test and measurement should be done under these conditions:

温度 Temperature ：23℃~27℃

相对湿度 Relative Humidity ：45%~75%RH

大气压 Atmospheric Pressure ：86kPa~106kPa

4.2 测量设备要求 Test & Measurement Equipment Requirement

1) 尺寸测量设备 Dimension Measurement Instrument :

测量尺寸的仪器的精度应优于 0.01mm。

The dimension measurement shall be implemented by instruments with equal or more precision scale of 0.01mm.

2) 电池测试系统的电流精度应在±0.1%以内，恒压精度±0.5%以内，计时精度±0.1%以内。

Battery test system should have current accuracy within ± 0.1%, voltage accuracy within ± 0.5% , & time accuracy within ± 0.1%.

3) 测量温度的仪表准确度应优于±0.5℃。

Temperature measurement accuracy of instruments should be within ± 0.5 ℃.

4) 电压表 Voltmeter：

国家标准或更灵敏等级，内阻不小于 10 KΩ.

Standard class specified in national standard or more sensitive class, with internal impedance not less than 10 KΩ.

5) 电流表 Ammeter：

国家标准或更灵敏等级，包括电流表和导线的总体内阻应小于 0.01Ω。

Standard class specified in national standard or more sensitive class. Total resistance including ammeter and wire is less than 0.01Ω.

6) 内阻测试方法为交流阻抗法(AC 1kHz LCR)。内阻不是恒定值，会随着温度及充电状态的饱和度变化而变化，并与引线长度、容量有关。

Impedance shall be measured by a sinusoidal alternating current method (AC 1kHz LCR). Resistance is not a constant value according to the change of temperature and state of charge, and related to lead length and capacity.

7) 所有测试设备、测量仪器需经检定机构检验合格。

All test equipments and measuring instruments should be passed inspection of calibration organization.

4.3 标准充电方法 Standard charging method

在标准测试条件下，以标准充电电流(0.2C_5A)恒流充电至充电截止电压，再以充电截止电压恒压充电至电流降低到0.02C_5A 或更小。

At standard test condition, charge battery pack with standard charge current (0.2C_5A) under constant current

mode to charge ending voltage, then charge battery pack with charge ending voltage under constant voltage mode till charge current declines to 0.02C_5A or less.

4.4 外观检验标准 Appearance Test Standard

电池外表面清洁，无电解液泄漏，无明显的划痕及机械损伤，无变形，无影响电池价值的其它外观缺陷。

There shall be no such defect as scratch, flaw, crack, rust, leakage, or which may adversely affect commercial value of battery.

5. 电气性能 Electrical properties

5.1 容量(0.5C_5A) Capacity @ 0.5C_5A

标准充电后,搁置0.5～1.0h,然后用1C_5A恒流放电至截止电压,记录放电时间。

After standard charging, laying the battery pack 0.5～1.0h, then discharging at 1C_5A to ending voltage, record the discharging time.

标准 Criteria: ≥57min

5.2 低温放电 Discharge at low temperature

标准充电后，在-20±2℃条件下贮存16h，然后用1C_5A放电至低温放电截止电压，记录放电时间。

After standard charging, laying the battery pack at -20±2℃ for 16h, then discharging at 1C_5A to low temperature discharge ending voltage, record the discharging time.

标准 Criteria: ≥39min

5.3 高温放电 Discharge at high temperature

标准充电后，在 60±2℃条件下贮存 2h，然后用 1C_5A 放电至截止电压，记录放电时间。

After standard charging, laying the battery pack at 60±2℃ for 2h , then discharging at 1C_5A to ending voltage, record the discharging time.

标准 Criteria: ≥57min

5.4 循环寿命 Cycle Life

标准充电后,搁置0.5～1.0h,然后用0.25C恒流放电至截止电压，再搁置0.5～1.0h，重复以上步骤，直到连续两次放电时间小于42分钟，记录充放电次数。

After standard charging, laying the battery pack 0.5～1.0h, then discharging at 0.25C to ending voltage，laying the battery pack 0.5～1.0h again, Repeat these steps above till two consecutive discharging time less than 42 minutes，record the cycle count.

标准 Criteria: ≥6000times

5.5 荷电保持能力 charge retention

标准充电后,搁置28天,然后用1C_5A恒流放电至截止电压,记录放电时间。

After standard charging, laying the battery pack 28 days, then discharging at 1C_5A to ending voltage, record the discharging time.

标准 Criteria: ≥51min

6. 环境适应性 Environmental Suitability

6.1 恒定湿热 Constant Damp Heat Test

标准充电后，在40±2℃/90%~95%条件下贮存48h，然后将电池组取出在标准测试环境下搁置2h。

After standard charging, keeping the battery pack in environment of 40±2℃/90%~95%RH for 48h, then laying the battery pack in standard test condition for 2h.

标准：无爆炸、无冒烟。

Criteria: No explosion or smoking.

6.2 振动测试 Vibration Test

标准充电后，将电池组安装在振动台上按照 10Hz~30Hz/0.38mm 和 30Hz~55Hz/0.19mm 的频率和振幅，在 X、Y、Z 三个方向上分别循环扫频振动 30min，扫频速率为 1oct/min，结束后观察电池外观及电压。

After standard charging, fix the battery pack to vibration table, vibrate the battery pack in each axis of X, Y, Z with frequency sweep rate of 1oct/min for 30 minutes under the vibration frequency and amplitude of both 10Hz~30Hz/0.38mm & 30Hz~55Hz/ 0.19mm.

标准：无爆炸、无冒烟、无漏液、电压不低于额定电压。

Criteria: No explosion, smoking or leakage. Battery pack's voltage not lower than rated voltage.

6.3 碰撞测试 Continuous Shock Test

标准充电后，将电池安装在碰撞台上按以下条件从X、Y、Z方向分别测试，测试结束后观察电池外观及电压。

After standard charging, fix the battery pack to shock table, shock the battery pack in each axis of X、Y、Z with these condition：

脉冲峰值加速度 Acceleration ： 100m/s^2

脉冲持续时间 Pulse lasting time ： 16ms

每分钟次数 Shock times per minutes ： 40~80 times

碰撞次数 Shock times ： 1000±10 times

标准：无爆炸、无冒烟、无漏液。

Criteria: No explosion. No smoking. No leakage.

7. 安全性能 Safety Characteristic

以下安全性能试验仅针对电池组所使用的单体电芯。

These safety Characteristic test is applied only to the cell used in this battery pack.

7.1 热冲击 Thermal shock

将电池组放进烘箱内，以5±2℃每分钟的速度升高烘箱内温度至130±2℃后，恒温30min。

Put the battery pack in the oven. Raise the temperature of the oven with 5±2℃ per minute to 130±2℃ and lasts 30 minutes.

标准：不起火、不爆炸。

Criteria: No fire, no explosion.

7.2 过放 Over Discharge

电池组以0.2 C_5A恒流放电至截止电压，然后外接300Ω负载放电24小时。

Discharge the battery pack with constant current of 0.2 C_5A to discharge ending voltage, then connect the battery pack to external load of 300 ohm for 24 hours.

标准：不起火、不爆炸、不冒烟、不漏液。
Criteria: No fire, no explosion, no smoke, no leakage.

7.3 短路 Short Circuit

将标准充电后电池组的放电端正负极用一根小于100 mΩ 的导线连接，放置 1小时。
After standard charging, connect the anode pole to cathode pole of the battery pack's discharge terminal by lead with impedance less than 100mΩ, keep 1 hour.
标准：不起火、不爆炸、不冒烟、不漏液。
Criteria: No fire, no explosion, no smoke, no leakage.

7.4 过充 Over Charge

电池组用 0.2 C5A 电流恒流充电至充电截止电压,然后以 10V 电压恒压充电，并在此电压下保持 10 小时，或电池电压不再上升为止。
Charge the battery pack with constant current of 0.2 C5A to charge ending voltage, then charge the battery pack with 10V of charge ending voltage,and with the constant voltage 10 hours,or until the cell voltage will not rise .
标准：不起火、不爆炸。
Criteria: No fire, no explosion.

8. 存储及运输要求 Storage and Shipment Requirement

项目 Item		标准 Criteria
存储温度 Storage temperature	短期(少于 1 个月) Short period(less than 1 month)	-10℃~45℃
	中期(少于 3 个月) Medium period (less than 3 month)	-10℃~35℃
	长期(超过 3 个月) Long period (more than 3 month)	0℃~30℃
相对湿度 Relative Humidity		≤75%RH
荷电状态 State of Charge		40%~60%

电池组在长时间存储时应每三个月充电一次，请客户使用标准充电电流的充电器充电 0.5h~1h 确保电池组保持 40%~60%电量。
Battery pack must be charged every three months when long term storage, please charge the battery pack with standard charging current for 0.5h~1h to keep 40%~60% state of charge.

9. 电池组的充电 Charge the Battery Pack

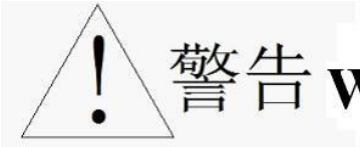
1) 请使用配套的专用充电器给电池组充电，并按说明书要求的方式连接。
Please charge the battery pack with matched specified charger, and connect them in the way required by the specification of the charger.
2) 充电时禁止将其他物品覆盖在电池组上，否则会使产生的热量积累，进而造成电池组性能的下降甚至发生漏液的现象。
Do not cover anything over the battery pack when charging it, otherwise the heat will accumulate, that may

cause declination of the performance of the battery pack and even cause leakage.

3) 充电时环境温度：0~45℃。

Charge the battery pack at 0~45℃.

10. 警告和注意 Warning and Caution



1) 禁止电池组正负极反接，或直接将电池组插入充电器的输入电源。

Do not connect the battery pack's positive (+) and negative (-) poles reversed to charger or load, Do not connect the battery pack to charger's input power source (AC power supply).

2) 禁止将电池组的电极与不必要的导线或者其他金属物质接触或储存在一起，以免发生短路。

Do not let the battery pack's terminals (+ and -) contact with unnecessary wire or any metal or stored them together, that may cause the battery pack short-circuit.

3) 禁止钉刺、敲击、抛掷、脚踩电池组。

Do not drive a nail in battery pack, hit the battery pack with a hammer, stamp on or throw the battery pack.

4) 禁止私自拆卸电池组或改装电池组外包装。

Do not disassemble or alter the batteries' outside structure.

5) 禁止在炙热的阳光下使用，否则可能会引起电池过热、起火或功能失效。

Do not use the battery pack under blazing sun, otherwise it may cause battery pack overheating then catch fire or function failure.

6) 严禁将电池组放入火中或者加热电池组，不要将电池组储存在高温环境中。

Do not put the battery pack into fire or heat the battery pack; do not store the battery pack in high temperature environment

7) 禁止将电池组放入水中或长时间淋雨，保存过程中应放置在阴凉干燥的环境中。

Do not submerge the battery pack in water or get wet in the rain, keep the battery in shady and cool place when stored.

8) 禁止连续充电超过 24 小时。

Do not charge the battery continuously over 24 hour.

9) 电池在充电的过程中不允许持续放电。

Do not discharge the battery pack continuously when charging it.

10) 电池在充电或放电过程中，如果出现异味、异响，请立即停止充电或放电，并与厂家联系。

When charging or discharging the battery pack, if you find any abnormal smell or noise, you must stop the charging or discharging at once, and contact the manufactory.

11) 电池在超出 0~30℃范围使用时，容量可能会有所下降，这并不代表电池已损坏。

When using the battery pack out of range of 0~30℃, the capacity may decrease, that doesn't mean the battery pack was failure.

12）电池中装有保护电路以避免各种意外情况发生。不要在产生静电的场所使用电池，因为静电（1000V 以上）容易损坏保护板，而导致电池工作不正常，发热、变形、冒烟或起火燃烧.

There is a protective circuit inside the battery to prevent contingency. Do not use the battery in the place of static electricity, (above 1000V), for it is easily destroyed the circuit board so that the battery doses not work and causes over-heated, distort, smoke or burning.

11. 典型故障及排除方法 Typical Fault and Exclusion Methods

故障现象 Fault Phenomenon	故障可能原因 Fault Possible Cause	排除方法 Exclusion Methods
电池组无输出 Battery pack no output	电池组放电线未连接 Discharge wire not connected	按照规格书要求正确连接放电线 Connect discharge wire correctly
	电池组放电保护后未恢复 The battery pack not released from discharge protect mode	断开开关约 30S 再闭合以解除放电保护 Switch off the battery pack for about 30S, then switch on it to release discharge protection
	电池组已没电 The battery pack is empty	给电池组充电 Charge the battery pack
电池组无法充电 Can't charge the battery pack	充电器输出插头松动 Output plug of charger poor contact	检查充电器输出插头与电池组是否接触牢靠 Ensure the output plug of charger firm contact with the battery pack
	电池组已充满电 The battery pack is fully charged	可以正常使用电池组 The battery pack is ready to discharge
充电器电源指示灯不亮 Power indicate LED of charger doesn't work	充电器输入插头未连接市电 Input plug of charger not connect to AC supply	将充电器输入插头按说明书要求插入市电插座 Connect input plug of charger to AC supply as specification required
备注：如遇其他问题，请与公司售后服务部或经销商联系。 Remark: Any other fault, please contact with after-sale service department or dealer.		

12. 免责声明 Statement

（1）电池组并不适用于所有电气设备，客户若需要将电池组用于超出文件规定以外的设备，或在文件规定以外的使用条件下使用电池组，应事先联系深圳市拓普威新能源有限公司商讨保护功能的完善性。至少应该咨询电池的大电流、快速充电、特殊应用的问题。否则引起的任何事故拓普威公司概不负责。

If the battery is used on other instruments or operating conditions than those described in this document, please contact with your manufacturer for how to get the best performance, at least consult its maximum current, fast charge and special application. Shenzhen Topway New Energy Co., Ltd

(2) 对于在超出文件规定以外的条件下使用电池而造成的任何意外事故，如超出使用的电流范围、电压范围、温度范围等，深圳市拓普威新能源有限公司概不负责。

Shenzhen Topway New Energy Co., Ltd will take no responsibility for any accident when the battery pack is used under other conditions than those described in this Document.

(3)如有必要，深圳市拓普威新能源有限公司会以书面形式告知客户有关正确操作使用电池组的改进措施。

Shenzhen Topway New Energy Co., will inform, in a written form, the customer of improvement(s)

regarding proper use and handing of the battery pack, if it is deemenecessary.

(4)未经深圳市拓普威新能源有限公司允许，客户不得擅自拆装、改装本产品，否则由此造成的任何事故及损失，拓普威公司概不负责。

Shenzhen Topway New Energy Co., Ltd will take no responsibility for any accident when the battery pack is disassembled that isn't subject to Topway approval.

(5)对于未采用深圳市拓普威新能源股份有限公司保护板/管理系统、充电器的电池组，客户有义务告知所采用保护板/管理系统、充电器的各项管理参数、控制策略，并经拓普威公司确认其匹配是否合理，否则对电池组在应用过程中由于非电池内部原因产生的故障、损失，拓普威公司概不负责。

Please tell the parameters of the BMS/PCM and charger, If they aren't provided by Topway Technology We will check the match-able quality between the BMS/charger and the battery. If you don't provide it, Topway will take no responsibility for any accident.

(6)由于不可抗力引起的损失，按照中华人民共和国相关法律规定执行。

The loss caused by force majeure should be implemented according to relevant laws and regulation

(7)任何本说明书中未提及的事项，须经双方协商确定。

Any of the matters not mentioned in the specification, subject to mutual consultation

请客户收到规格书后，及时确认回传，如客户收到本规格书后三天内没有回传，则示默认为本规格书内容。

Please confirm the specification timely after got it. If you haven't confirmed it after got specification within three days, it shows the default content of the specification.

13. 修订记录 Revision History

版本 Version	变更内容 Details of Change	日期 Date	修订 Revise
A.0	初次发行	2022.12.1	