Test Report issued under the responsibility of:

TEST REPORT
IEC 62619
Secondary cells and batteries containing alkaline or other non-acid electrolytes – Safety requirements for secondary lithium cells and batteries, for use in industrial applications

Report Number.....:	SHES230901719401
Date of issue.....:	2024-03-11
Total number of pages.....:	25 Pages
Name of Testing Laboratory preparing the Report.....:	SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.
Applicant's name .....:	Each Energy Technology (Suzhou) Co., Ltd.
Address .....:	3F, Building 4, No.50 North Guandu Road, Yuexi Street, Wuzhong District, Suzhou, Jiangsu, China
Test specification:	
Standard .....:	IEC 62619:2022
Test procedure .....:	CB Scheme
Non-standard test method.....:	N/A
TRF template used .....:	IECEE OD-2020-F1:2022, Ed.1.5
Test Report Form No.....:	IEC62619B
Test Report Form(s) Originator ....:	UL Solutions (Demko)
Master TRF .....:	Dated 2023-02-24

If this Test Report Form is used by non-IECEE members, the IECEE/IEC logo and the reference to the CB Scheme procedure shall be removed.

This report is not valid as a CB Test Report unless signed by an approved IECEE Testing Laboratory and appended to a CB Test Certificate issued by an NCB in accordance with IECEE 02.

General disclaimer:

The test results presented in this report relate only to the object tested.
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Test item description..... :	Rechargeable Li-ion Battery Pack
Trademark(s)..... :	--
Manufacturer..... :	Same as applicant
Model/Type reference..... :	M10
Ratings..... :	Rated Voltage: 96 V Rated Capacity: 100 Ah

Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):			
☒	**CB Testing Laboratory:**	SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.	
Testing location/ address.....:		588 West Jindu Road, Xinqiao, Songjiang, 201612 Shanghai, China.	
Tested by (name, function, signature).....:		Eric Wang Project Engineer	
Approved by (name, function, signature)...:		Bruce Wu Project Reviewer	
☐	**Testing procedure: CTF Stage 1:**	N/A	
Testing location/ address.....:			
Tested by (name, function, signature).....:			
Approved by (name, function, signature)...:			
☐	**Testing procedure: CTF Stage 2:**	N/A	
Testing location/ address.....:			
Tested by (name + signature) .....:			
Witnessed by (name, function, signature)..:			
Approved by (name, function, signature)...:			
☐	**Testing procedure: CTF Stage 3:**	N/A	
☐	**Testing procedure: CTF Stage 4:**	N/A	
Testing location/ address.....:			
Tested by (name, function, signature).....:			
Witnessed by (name, function, signature)..:			
Approved by (name, function, signature)...:			
Supervised by (name, function, signature) :			

List of Attachments (including a total number of pages in each attachment):

Attachment 1: 9 pages of Photos;

Attachment 2: 3 pages of Information for safety;

Attachment 3: 1 page of Packaging;

Attachment 4: 1 page of Product specification.

Summary of testing:

The sample(s) tested complies with the requirements of IEC 62619: 2022.

Remark:

1. Only battery system was considered and tested according to standard in this report as the cell (model: LF105) was certified according to IEC 62619: 2022 by TÜV SÜD (CB test report No.: 085-282360441-000, Certif. No.: SG PSB-BT-04027);

2. The functional safety requirement in clause 8 was also evaluated according to Annex H of IEC 60730-1 (SGS Report No. SHFS230900035671).

Tests performed (name of test and test clause):	**Testing location: (CBTL, SPTL, CTF, Subcontractor)**
☐7.2.1 External short-circuit test (cell or cell block) ☐7.2.2 Impact test (cell or cell block) ☒7.2.3 Drop test (cell or cell block, and battery system) ☐7.2.4 Thermal abuse test (cell or cell block) ☐7.2.5 Overcharge test (cell or cell block) ☐7.2.6 Forced discharge test (cell or cell block) ☐7.3.2 Internal short-circuit test (cell) ☐7.3.3 Propagation test (battery system) ☒8.2.2 Overcharge control of voltage (battery system) ☒8.2.3 Overcharge control of current (battery system) ☒8.2.4 Overheating control (battery system)	SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. 588 West Jindu Road, Xinqiao, Songjiang, 201612 Shanghai, China

Summary of compliance with National Differences (List of countries addressed):

EU Group Differences, GB

☒ **The product fulfils the requirements of EN IEC 62619: 2022 and BS EN IEC 62619: 2022.**

Use of uncertainty of measurement for decisions on conformity (decision rule) :

☒ No decision rule is specified by the IEC standard, when comparing the measurement result with the applicable limit according to the specification in that standard. The decisions on conformity are made without applying the measurement uncertainty ("simple acceptance" decision rule, previously known as "accuracy method").

☐ Other: … (to be specified, for example when required by the standard or client, or if national accreditation requirements apply)

Information on uncertainty of measurement:

The uncertainties of measurement are calculated by the laboratory based on application of criteria given by OD-5014 for test equipment and application of test methods, decision sheets and operational procedures of IECEE.

IEC Guide 115 provides guidance on the application of measurement uncertainty principles and applying the decision rule when reporting test results within IECEE scheme, noting that the reporting of the measurement uncertainty for measurements is not necessary unless required by the test standard or customer.

Calculations leading to the reported values are on file with the NCB and testing laboratory that conducted the testing.

Copy of marking plate:

The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.

Rechargeable Li-ion Battery Pack

Product model: M10

Rated voltage: 96 Vdc

Rated capacity: 100 Ah

Rated energy: 9600 Wh

Designation: IFpP37/131/201[((8S)+(7S))2S]E/-20+40/90

Do not disassemble or modify

Do not dispose in fire

Manufactured: 2023-09

Each Energy Technology (Suzhou) Co., Ltd.

Remark:

Disposal instructions and recommended charge instructions were included in Battery System Information for safety and Specification, see attachment 2 and attachment 4 for details.

Test item particulars .....:	--
Classification of installation and use.....:	To be defined in final products
Supply Connection .....:	Not directly connected to mains
.....:	--
Possible test case verdicts:	
- test case does not apply to the test object..... :	N/A
- test object does meet the requirement..... :	P (Pass)
- test object does not meet the requirement..... :	F (Fail)
Testing ..... :	
Date of receipt of test item..... :	2023-09-07
Date (s) of performance of tests ..... :	2023-10-21 to 2023-10-25

General remarks:

"(See Enclosure #)" refers to additional information appended to the report.
"(See appended table)" refers to a table appended to the report.

Throughout this report a ☒ comma / ☐ point is used as the decimal separator.

Manufacturer's Declaration per sub-clause 4.2.5 of IECEE 02:

The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided.....:	☐ **Yes** ☒ **Not applicable**

When differences exist; they shall be identified in the General product information section.

Name and address of factory (ies)..... : Same as applicant

General product information and other remarks

Product description:	Rechargeable Li-ion Battery Pack
Model of Battery:	M10
Designation of Battery:	IFpP37/131/201[((8S)+(7S))2S]E/-20+40/90
Nominal voltage of Battery:	96 V
Max. charging voltage of Battery:	108 V
End of discharge voltage of Battery:	81 V
Rated capacity of Battery:	100 Ah
Maximum charge current of Battery:	50 A
Maximum discharge current of Battery:	50 A
Charging temperature range of Battery:	0-45 °C
Discharge temperature range of Battery:	-20-55 °C
Number of cells in battery:	((8S)+(7S))2S
Standard charging method (declared by manufacturer):	Charge with constant current 50 A until the voltage reaches 108 V, then charge with constant voltage 108 V until the current reaches 5 A.
Model of cell:	LF105
Rated voltage of cell:	3,2 V
Rated capacity of cell:	105 Ah
Maximum charge current of cell:	105 A

Remark: See also Attachment 4 for details.

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict
4	**PARAMETER MEASUREMENT TOLERANCES**		**P**
	Parameter measurement tolerances		P
5	**GENERAL SAFETY CONSIDERATIONS**		**P**
5.1	**General**		**P**
	Cells and batteries are safe under conditions of both intended use and reasonably foreseeable misuse… :	Clause 6, Clause 7, 8.1, and 8.2. See also table 5.1 for Critical components information	P
	Reduce the risk of injuries from moving parts		P
5.2	**Insulation and wiring**		**P**
	Voltage, current, altitude, and humidity requirements		P
	Adequate clearances and creepage distances between connectors and live parts at different voltages or between live parts and non-current-carrying accessible parts		P
	Protect from hazardous live parts, including during installation		P
	The mechanical integrity of internal connections		P
5.3	**Venting**		**P**
	Pressure relief function	Cell: A pressure relief mechanism was used to relieve excessive internal pressure. Pack: Metal enclosure secured by screws, aperture as the venting mechanism of battery system.	P
	Encapsulation used to support cells within an outer casing	Metal encapsulation ware used to support cells, will not cause the pack to overheat during normal operation nor inhibit pressure relief.	P
5.4	**Temperature/voltage/current management**		**P**
	The design prevents abnormal temperature-rise	BMS was used to prevent abnormal temperature-rise	P
	Voltage, current, and temperature limits of the cells	Overcharge, over current and overheating protect circuit used in this battery. See tests of clause 8.	P
	Specifications and charging instructions for equipment manufacturers		P
5.5	**Terminal contacts of the battery pack and/or battery system**		**P**

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Clause	Requirement + Test	Result - Remark	Verdict
	Polarity marking(s)		P
	Polarity marking not provided for keyed external connector		N/A
	Capability to carry the maximum anticipated current		P
	External terminal contact surfaces		P
	Terminal contacts are arranged to minimize the risk of short circuits		P
5.6	**Assembly of cells, modules, or battery packs into battery systems**		**P**
5.6.1	General		P
	Independent control and protection method(s)		P
	Recommendations of cell operating limits, mounting advice, storage conditions and other design recommendations by the cell manufacturer		P
	Batteries designed for the selective discharge of a portion of their series connected cells		N/A
	Protective circuit component(s) and consideration to the end-device application		P
5.6.2	Battery system design		P
	The voltage control function		P
	Maximum charging/discharging current of the cell are not exceeded		P
5.7	**Operating region of lithium cells and battery systems for safe use**		**P**
	The cell operating region.....:	Voltage range: 2,0 V to 3,8 V Maximum charge current: 105 A Maximum discharge current: 105 A Charge temperature range: 0-65 °C Discharge temperature range: -35-65 °C.	P
	Designation of battery system to comply with the cell operating region		P
5.8	**System lock (or system lock function)**		**P**
	Non-resettable function to stop battery operation		P
	Manual with procedure for resetting of battery operation		P
	Emergency battery final discharge		P
5.9	**Quality plan**		**P**
	Manufacturing quality plan (for example: ISO9001, etc.) prepared and implemented.....:	Quality plan self-declaration was submitted.	P

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict
	The process capabilities and the process controls		P

6	**TYPE TEST CONDITIONS**		**P**
6.1	**General**		**P**
6.2	**Test items**		**P**
	Cells or batteries that are not more than six months old (See Table 1 of IEC 62619)		P
	Capacity confirmation of the cells or batteries		P
	Default ambient temperature of test, 25 °C ± 5 °C	Tests were carried out in an ambient temperature of 25 °C ± 5 °C.	P

7	**SPECIFIC REQUIREMENTS AND TESTS**		**P**
7.1	**Charging procedure for test purposes**		**P**
	The battery discharged to a specified final voltage prior to charging	Discharge with constant current 20 A (0,2 C) until the voltage reaches 81 V	P
	The cells or batteries charged using the method specified by the manufacturer .....:	Charge with constant current 50 A until the voltage reaches 108 V, then charge with constant voltage 108 V until the current reaches 5 A.	P
7.2	**Reasonably foreseeable misuse**		**P**
7.2.1	External short-circuit test (cell or cell block)	Approval cell used.	N/A
	Short circuit with total resistance of 30 m ± 10 m at 25 °C ± 5 °C		N/A
	Results: no fire, no explosion		N/A
7.2.2	Impact test (cell or cell block)	Approval cell used.	N/A
	Cylindrical cell, longitudinal axis impact		N/A
	Prismatic cell, longitudinal axis and lateral axis impact		N/A
	Results: no fire, no explosion.		N/A
7.2.3	Drop test (cell or cell block, and battery system)		P
7.2.3.1	General		P
7.2.3.2	Whole drop test (cell or cell block, and battery system)		N/A
	Description of the Test Unit.....:		—
	Mass of the test unit (kg).....:		—
	Height of drop (m).....:		—

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Clause	Requirement + Test	Result - Remark	Verdict
	Results: no fire, no explosion		N/A
7.2.3.3	Edge and corner drop test (cell or cell block, and battery system)		P
	Description of the Test Unit..... :	Battery pack	—
	Mass of the test unit (kg)..... :	Approx. 90 kg	—
	Height of drop (m)..... :	5 cm	—
	Results: no fire, no explosion		P
7.2.4	Thermal abuse test (cell or cell block)	Approval cell used.	N/A
	Results: no fire, no explosion		N/A
7.2.5	Overcharge test (cell or cell block)	Approval cell used.	N/A
	For those battery systems that are provided with only a single protection for the charging voltage control		—
	Results: no fire, no explosion ..... :		N/A
7.2.6	Forced discharge test (cell or cell block)	Approval cell used.	N/A
	Cells connected in series in the battery system..... :		N/A
	Redundant or single protection for discharge voltage control provided in battery system ..... :		N/A
	Target Voltage..... :		N/A
	Maximum discharge current of the cell, Im..... :		N/A
	Discharge current for forced discharge, 1.0 It..... :		N/A
	Discharging time, t = (1 It / Im) x 90 (min.)..... :		N/A
	Results: no fire, no explosion ..... :		N/A
7.3	**Considerations for internal short-circuit – Design evaluation**		**N/A**
7.3.1	General		N/A
7.3.2	Internal short-circuit test (cell)	Approval cell used.	N/A
	Samples preparation procedure: In accordance with Clause A.5 and A.6 of IEC 62133-2:2017		N/A
	Tested per 7.3.2 b) in an ambient temperature of 25 °C ± 5 °C.		N/A
	The appearance of the short-circuit location recorded by photograph or other means..... :		—
	The pressing was stopped - When a voltage drop of 50 mV was detected; or		N/A
	- The pressing force of 800 N (cylindrical cells) or 400 N (prismatic cells) was reached		N/A
	Results: no fire ..... :		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
7.3.3	Propagation test (battery system)	Internal short-circuit test has been considered in cell CB report.	N/A
	Method to create a thermal runaway in one cell ... :		N/A
	Results: No external fire from the battery system, no battery case rupture..... :		N/A

8	**BATTERY SYSTEM SAFETY (CONSIDERING FUNCTIONAL SAFETY)**		**P**
8.1	**General requirements**		**P**
	Functional safety analysis for critical controls	The functional safety requirement was evaluated according to Annex H of IEC 60730-1 (SGS Report No. SHFS230900035671).	P
	Conduct of a process hazard analysis for both the cell manufacturing process and the battery system manufacturing process		P
	Conduct of risk assessment and mitigation of the battery system		P
8.2	**Battery management system (or battery management unit)**		**P**
8.2.1	Requirements for the BMS		P
	The safety integrity level (SIL) target of the BMS	Class B per IEC 60730-1	P
	The charge control evaluated by tests in clauses 8.2.2 to 8.2.4		P
8.2.2	Overcharge control of voltage (battery system)		P
	The exceeded charging voltage applied to the whole battery system		P
	The exceeded charging voltage applied to only a part of the battery system, such as the cell(s) ..... :		N/A
	Results: no fire, no explosion ..... :	See Table 8.2.2.	P
	The BMS terminated the charging before exceeding the upper limit charging voltage		P
8.2.3	Overcharge control of current (battery system)		P
	Results: no fire, no explosion ..... :	See Table 8.2.3	P
	The BMS detected the overcharging current and controlled the charging to a level below the maximum charging current		P
8.2.4	Overheating control (battery system)		P
	The cooling system, if provided, was disconnected		P
	Elevated temperature for charging, 5 °C above maximum operating temperature..... :	50 °C	P

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Clause	Requirement + Test	Result - Remark	Verdict
	Results: no fire, no explosion .....:	See Table 8.2.4	P
	The BMS detected the overheat temperature and terminated charging		P
	The battery system operated as designed during test		P
9	**EMC**		**P**
	Battery system fulfil EMC requirements of the end-device application.....:	The EMC requirement of battery pack was evaluated according to EN IEC 61000-6-1:2019, EN IEC 61000-6-3:2021 (SGS Reprot No. SHEM231100712401)	P
10	**INFORMATION FOR SAFETY**		**P**
	The cell manufacturer provides information about current, voltage and temperature limits of their products		N/A
	The battery system manufacturer provides information regarding how to mitigate hazards to equipment manufacturers or end-users.	See attachment 2	P
11	**MARKING AND DESIGNATION (REFER TO CLAUSE 5 OF IEC 62620)**		**P**
	The marking items shown in Table 1 in IEC 62620 indicated on the cell, battery system or instruction manual.	See page 5	P
	Cell or battery system has clear and durable markings		P
	Cell designation		N/A
	Battery designation	IFpP37/131/201[((8S)+(7S))2S]E/-20+40/90	P
	Battery structure formulation	((8S)+(7S))2S	P
12	**PACKAGING AND TRANSPORT**		P
	Refer to Annex D		P
ANNEX A	**OPERATING REGION OF CELLS FOR SAFE USE**		**N/A**
A.1	General	Has been considered in cell test report.	N/A
A.2	Charging conditions for safe use		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
A.3	Consideration on charging voltage		N/A
A.4	Consideration on temperature		N/A
A.5	High temperature range		N/A
A.6	Low temperature range		N/A
A.7	Discharging conditions for safe use		N/A
A.8	Example of operating region		N/A

ANNEX B	**PROCEDURE OF 7.3.3 PROPAGATION TEST BY LASER IRRADIATION**		**N/A**
B.1	**General**		**N/A**
B.2	**Test conditions**		**N/A**
B.2.1	Cell test (preliminary test)		N/A
	The cell fully charged according to the manufacturer recommended conditions.....:		—
	Laser irradiation point on the cell.....:		—
	Output power of laser irradiation.....:		—
	Tested in an ambient temperature of 25 °C ± 5 °C		N/A
	Repeat of cell test for 3 times		N/A
B.2.2	Battery system test (main test)		N/A
	The battery system fully charged according to the manufacturer recommended conditions.....:		—
	Target cell to be laser irradiated .....:		—
	The irradiation point on the target cell same or similar as that on the cell test		N/A
	Output power of laser irradiation.....:		—
	Tested in an ambient temperature of 25 °C ± 5 °C		N/A

ANNEX C	**PROCEDURE OF 7.3.3 PROPAGATION TEST BY METHODS OTHER THAN LASER**		**N/A**
C.1	General		N/A
C.2	Test conditions:		N/A
	– The battery fully charged according to the manufacturer recommended conditions.....:		—
	– Target cell forced into thermal runaway .....:		—
	– A specially prepared sample (e.g. a heater or a hole for nail penetration provided) used for ease of testing.....:		—

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Clause	Requirement + Test	Result - Remark	Verdict
C.3	Method used for initiating the thermal runaway. 1) Heater (Heater, Burner, Laser, Inductive heating 2) Overcharge 3) Nail penetration of the cell 4) Combination of above methods 5) Other methods ..... :		—

ANNEX D	**PACKAGING AND TRANSPORT**		**P**
	The materials and pack design chosen in a way as to prevent the development of unintentional electrical conduction, corrosion of the terminals and ingress of environmental contaminants	See attachment 3	P
	Regulations concerning international transport of secondary lithium batteries		P

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict

5.1	TABLE: Critical components information				P
Object / part No.	**Manufacturer/ trademark**	**Type / model**	**Technical data**	**Standard**	**Mark(s) of conformity[1)]**
Cell	EVE Power Co., Ltd.	LF105	3,2 V, 105 Ah	IEC 62619:2022 EN IEC 62619:2022	TÜV SÜD (CB Cert. No.: SG PSB-BT-04027 Report No.: 085-282360441-000)
System enclosure	Zhejiang Xinwei Machinery Co., Ltd.	SGCC-1.2T	Min.thickness: 2 mm, galvanized iron plate	--	--
Battery positive connector on system enclosure	Jiangsu Handa power technology Co., Ltd.	HDC-70f3	1000 Vdc, 70 A	IEC 61984 EN 61984	TÜV Rheinland (R 50595475 0001)
Battery negative connector on system enclosure	Jiangsu Handa power technology Co., Ltd.	HDC-70m3	1000 Vdc, 70 A	IEC 61984 EN 61984	TÜV Rheinland (R 50595475 0001)
Power connector on system enclosure	Sanco Intelligent Connector Technology Co., Ltd.	HVP0115-100-M4K-001	500 Vdc, 100 A	EN 61984	TÜV Rheinland (R 50502826 0001)
Circuit breaker on system enclosure	NOARK Electrics (Shanghai) Co., Ltd.	Ex9BP	500 Vdc, 63 A	EN 60947-2	TÜV SÜD (N8A 075006 0046)
Power wires of system	DANYANG WINPOWER WIRE & CABLE MFG CO LTD	10269	8 AWG, 105 °C, 1000 Vac	UL 758	UL (E330446)
Module enclosure	Hangzhou Jinda Hardware Manufacturing Co., Ltd.	YQ-004	Min.thickness: 1,2 mm, Material: SPCC	--	--
Circuit breaker of module	ZHEJIANG CHINT ELECTRICS CO LTD	NXB-125	110 V, 125 A	UL 1077	UL (E218757)
Shunt trip of module	ZHEJIANG CHINT ELECTRICS CO LTD	SHT-X3	24 V	UL 1077	UL (E218757)

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Clause	Requirement + Test	Result - Remark	Verdict

Power connector on module enclosure	SHENZHEN CONNECTION ELECTRONIC CO LTD	DSTB22	600 V, 75 A	UL 1059	UL (E304128)
Heat shrinkable tubing	SHENZHEN WOER HEAT-SHRINKABLE MATERIAL CO LTD	RSFR-H	VW-1, 125 °C, 600 V	UL 224	UL (E203950)
Power wires inside module	Zhongshan City Dingxiang Electrical Co Ltd	3512	6 AWG, 200 °C, 600 Vac	UL 758	UL (E354487)
Signal wires inside module	Zhongshan City Dingxiang Electrical Co Ltd	3512	10 AWG, 200 °C, 600 Vac	UL 758	UL (E354487)
Epoxy board inside module	JM Excore Tech Co Ltd	H-840N	Epoxy Industrial laminates, V-0, Min. thickness: 0,38 mm, 130 ºC	UL 94 UL 746E	UL (E335867)
BMS	Hangzhou Kaige New Energy Technology Co., Ltd.	KG-UP16S001-REV3	--	--	--
- PCB	HANGZHOU YINGPAI TECHNOLOGY CO LTD	YP-02	V-0, 130 °C	UL 796	UL (E492700)
- AFE (IC18)	SINO WEALTH	SH367309	Over charge protection voltage: 3,7 ±0,025 V Over discharge protection voltage: 2,5 ± 0,05 V; Temperature range: -40 °C - 85 °C	--	--
- MCU (U1)	ST	STM32F103VCT6	Supply voltage: 0 V to 3,6 V Ta: -40 to 85 °C	--	--
- MOSFET (M15 – M34)	Wuxi NCE Electric Power Co., Ltd.	NCEP02T10D	Vds: 200 V; Id: 100 A; Temperature range: -55 °C - 175 °C	--	--

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Clause	Requirement + Test	Result - Remark	Verdict

- DC-DC converter	MORNSUN GUANGZHOU SCIENCE & TECHNOLOGY CO., LTD.	B1212S-1WR2	Input: 12 Vdc, Output: 12 Vdc, 0,084 A	UL 60950-1	UL (E235235)
- NTC (R287)	Guangdong Xinshiheng Technology Co. , Ltd.	MF52$103&3435	Resistance at 25°C: 10 k ohm Tmoa: 105 °C	UL 1434	UL (E526963)
- Coin Cell (BAT1)	Shenzhen Lidea Battery Co Ltd	CR1220	3 V, 40 mAh	UL 1642	UL (MH60145)
- Digital Isolator (IC3, IC5, IC8, IC9)	Suzhou Novosense Microelectronics Co.,Ltd	NSi8122N1	Isolation volatge: 3750 Vrms	UL 1577	UL (E500602)
- Optical coupler (P1, P2, P4, P6, P7)	EVERLIGHT ELECTRONICS CO LTD	EL357NC	Isolation volatge: 3750 Vrms	UL 1577	UL (E214129)
- Resistor (RS1, RS2)	RALEC	0.01R-2W-2512-1%	10 m ohm, 2 W	--	--
Supplementary information: [1)] Provided evidence ensures the agreed level of compliance. See OD-CB2039.					

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict

7.2.1	TABLE: External short-circuit test (cell or cell block)				N/A
Sample No.	**Ambient (at 25°C ± 5°C)**	**OCV at start of test (V dc)**	**Resistance of Circuit (mΩ)**	**Maximum Case Temperature Rise ΔT (°C)**	**Results**
--	--	--	--	--	--

Supplementary information:

A – No fire or Explosion
B – Fire
C – Explosion
D – The test was completed after 6 h
E – The test was completed after the cell casing cooled to 20% of the maximum temperature rise
F – Other (Please explain):___

7.2.5	TABLE: Overcharge test (cell or cell block)					N/A
Sample No.	**OCV at start of test (V dc)**	**OCV at end of test (V dc)**	**Measured Maximum Charging Current (A)**	**Measured Maximum Charging Voltage (V dc)**	**Max. Cell Case Temperature, (°C)**	**Results**
--	--	--	--	--	--	--

Supplementary information:

Results:
A – No fire or Explosion
B – Fire
C – Explosion
D – Test concluded when temperature reached a steady state condition
E – Test concluded when temperature returned to ambient
F – Other (Please explain): _____

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict

7.2.6	TABLE: Forced discharge test (cell or cell block)				N/A
Sample No.	**OCV before applying reverse charge, (V dc)**	**Target Voltage (V dc)**	**Measured Reverse Charge Current It, (A)**	**Total Time for Reversed Charge Application (min)**	**Results**
--	--	--	--	--	--

Supplementary information:

Results:
A – No fire or Explosion
B – Fire
C – Explosion
D – Other (Please explain): ___

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict

7.3.2	TABLE: Internal short-circuit test (cell)			N/A
Sample No.	**OCV at start of test, (V dc)**	**Particle location [1)]**	**Maximum applied pressure, (N)**	**Results**
--	--	--	--	--

Supplementary information:

[1)] Identify one of the following**:**

1: Nickel particle inserted between positive and negative (active material) coated area.

2: Nickel particle inserted between positive aluminium foil and negative active material coated area.

Results:

A – No fire or explosion
B – Fire
C – Explosion
D – Test concluded when 50 mV voltage drop occurred prior to reaching force limit
E – Test concluded when 800/400 N pressure was reached and 50 mV voltage drop was not achieved
F – Test was concluded when fire or explosion occurred
G – Other (Please explain): __

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict

7.3.3	TABLE: Propagation test (battery system)				N/A
Sample No.	**OCV of Battery System Before Test, (V dc)**	**OCV of Target Cell Before Test, (V dc)**	**Maximum Cell Case Temperature, (°C)**	**Maximum DUT Enclosure Temperature, (°C)**	**Results**
--	--	--	--	--	--

Method of cell failure [1)]	Location of target cell	Area for fire protection (m^2)
--	--	--

Supplementary information:

1) Cell can be failed through laser exposure, applied heat, overcharge, nail penetration or combinations of these failures or other acceptable methods. See supporting documentation for details on cell failure method

2) If the battery system has no outer covering, the manufacturer is required to specify the area for fire protection.

Results:
A – No fire external to DUT enclosure or area for fire protection or no battery case rupture
B – Fire external to DUT enclosure or area for fire protection
C – Explosion
D – Battery case rupture
E – Other (Please explain): __

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict

8.2.2	TABLE: Overcharge control of voltage (battery system)				P
Sample No.	**OCV at start of test for Cell/Cell Blocks, (V dc)**	**Maximum Charging Current, (A)**	**Max. Charging Voltage, (V dc)**	**Max. Voltage of Cell/Cell Blocks, (V dc)**	**Results**
M1	2,748 to 3,084	50	108	3,600	A, D, F
			Charge Voltage Applied Battery System: 1)		
			Whole		**Part**
			125,4 Vdc		--

Supplementary information:

1) The exceeded voltage can be applied to only a part of the system such as the cell(s) in the battery system per Figure 6 of IEC 62619, if it is difficult to do it in using the whole battery system.

Results:
A – No Fire or Explosion
B – Fire
C – Explosion
D – The voltage of the measured cells or cell blocks did not exceed the upper limit charging voltage
E – The voltage of the measured cells or cell blocks did exceed the upper limit charging voltage
F – All function of battery system did operate as intended during the test.
G – All function of battery system did not operate as intended during the test.
H – Other (Please explain): ___

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict

8.2.3	TABLE: Overcharge control of current (battery system)			P
Sample No.	**OCV at start of test, (V dc)**	**Max. Charging Current, (A)**	**Max. Charging Voltage, (V dc)**	**Results**
M1	88,734	60	108	A, D, F

Supplementary information:

Results:
A – No fire or Explosion
B – Fire
C – Explosion
D – Overcurrent sensing function of BMU did operate and then charging stopped
E – Overcurrent sensing function of BMU did not operate and then charging stopped
F – All function of battery system did operate as intended during the test.
G – All function of battery system did not operate as intended during the test.
H – Other (Please explain): ____

8.2.4	TABLE: Overheating control (battery system)		P
Model No.	**OCV at start(SOC 50%) of test, V dc**	**Maximum Charging Current, A**	**Measured Maximum Charging Voltage, V dc**
M1	99,102	50	99,416
Maximum Specified Temperature of Battery System, °C		**Maximum Measured Cell Case Temperature, °C**	**Results**
45		50	A, D, F

Supplementary information:

Results:
A – No fire or Explosion
B – Fire
C – Explosion
D – Temperature sensing function of BMU did operate and then charging stopped
E – Temperature sensing function of BMU did not operate and then charging stopped
F – All function of battery system did operate as intended during the test.
G – All function of battery system did not operate as intended during the test.
H – Other (Please explain): ____

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict

9	**TABLE: EMC**				**N/A**
Standard used for EMC test:			**--**		
Sample No.	**EMC Test Item**	**Battery Condition**	**EMC Test Level/ Parameters**	**Compliance Criteria**	**Results**
--	--	--	--	--	--
Supplementary information: See EMC report No. SHEM231100712401					

- - - End of Report - - -

Attachment 1 Photo documentation

External view of battery

Attachment 1 Photo documentation

External view of battery

Attachment 1 Photo documentation

External view of battery

Internal view of battery

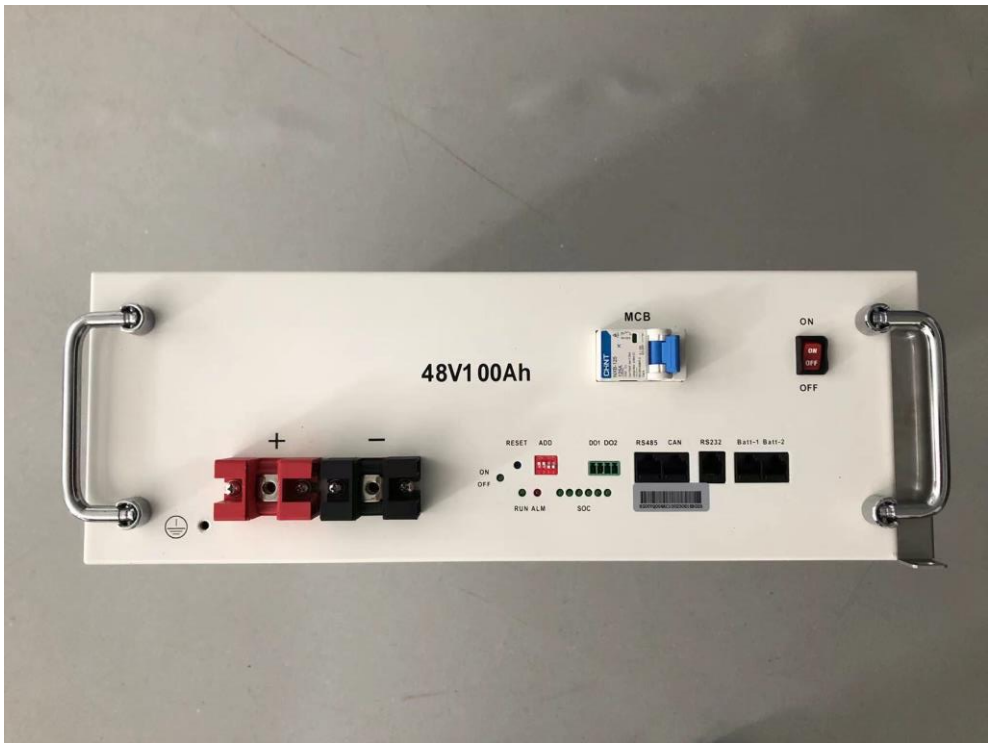
Attachment 1 Photo documentation

Internal view of battery

External view of inner battery module

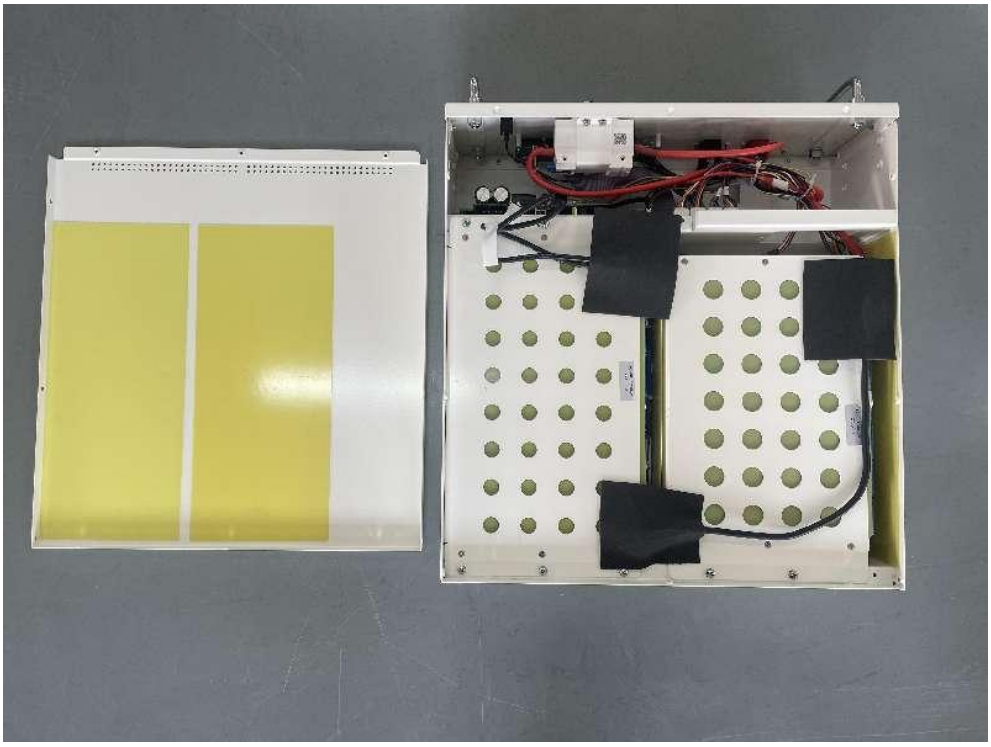
Attachment 1 Photo documentation

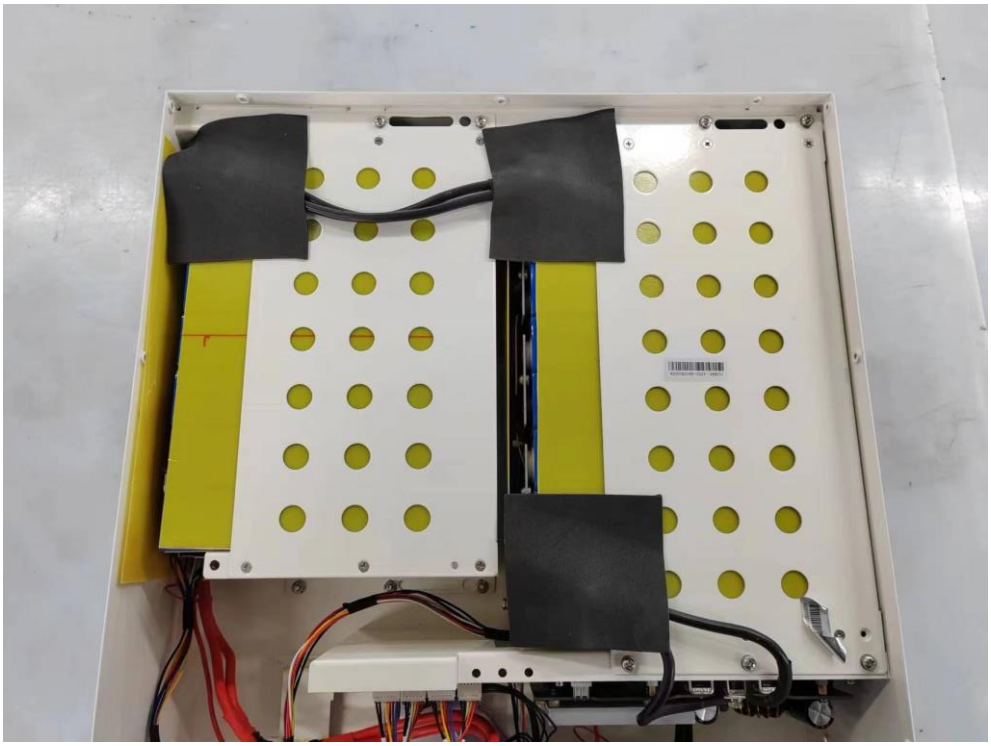
External view of inner battery module



Attachment 1 Photo documentation

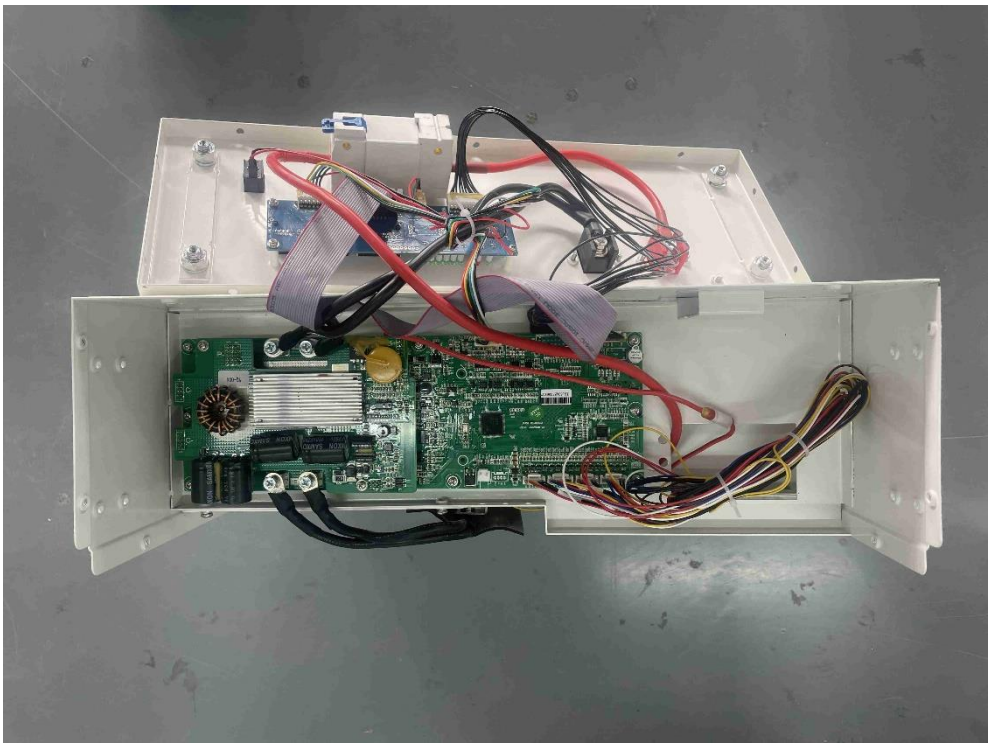
Internal view of inner battery module





Attachment 1 Photo documentation

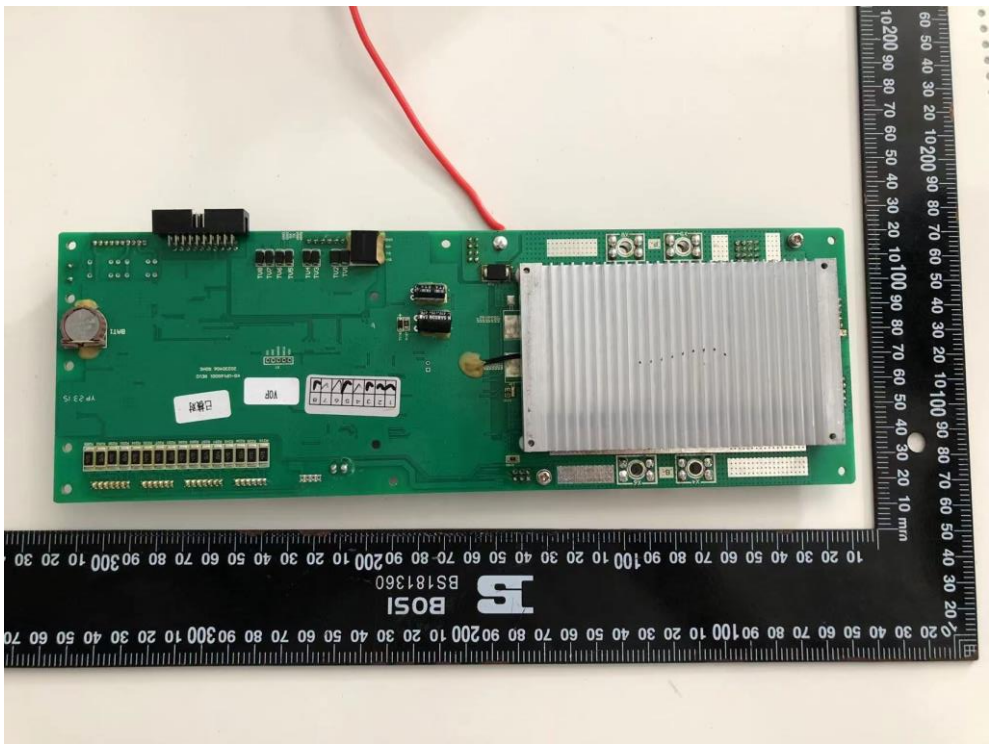
Internal view of inner battery module

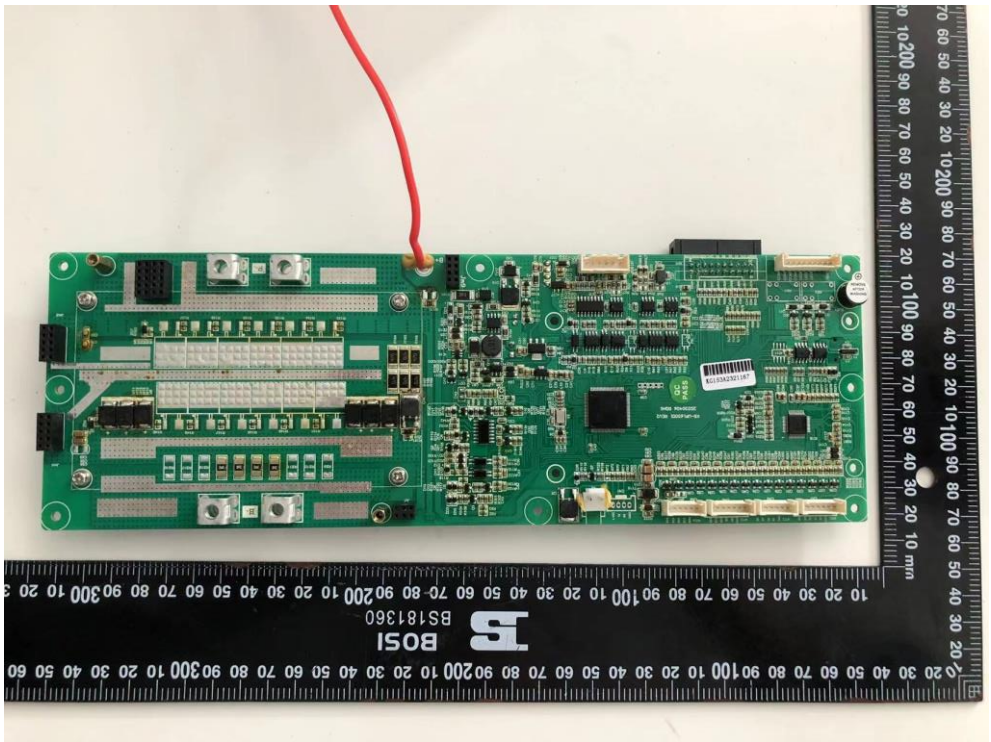


BMS

Attachment 1 Photo documentation

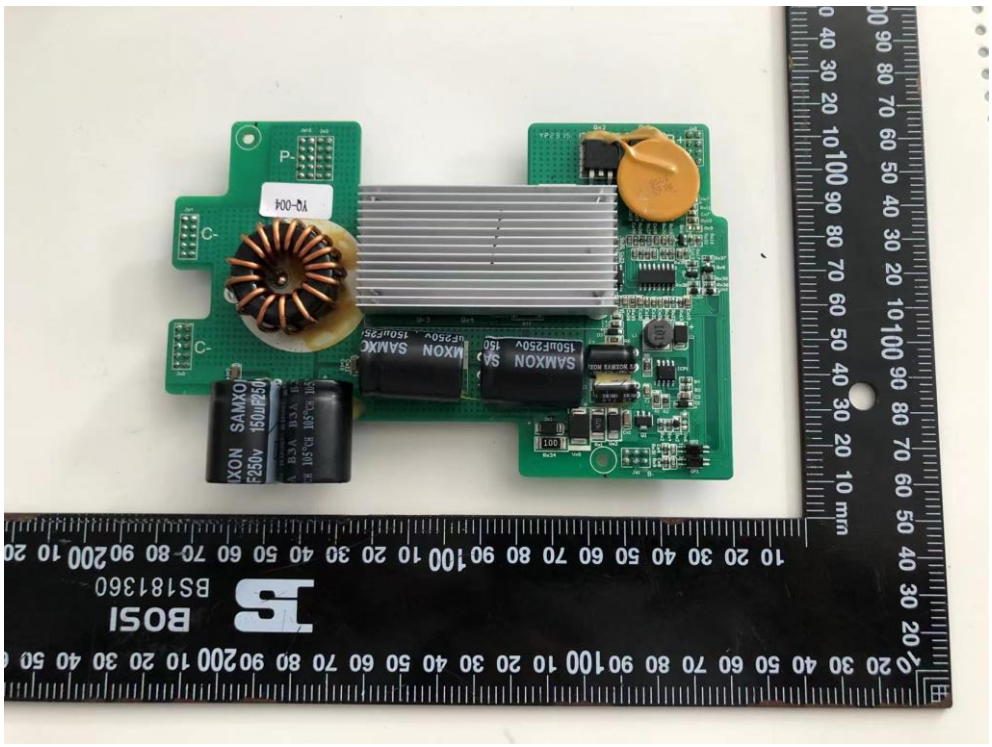
BMS

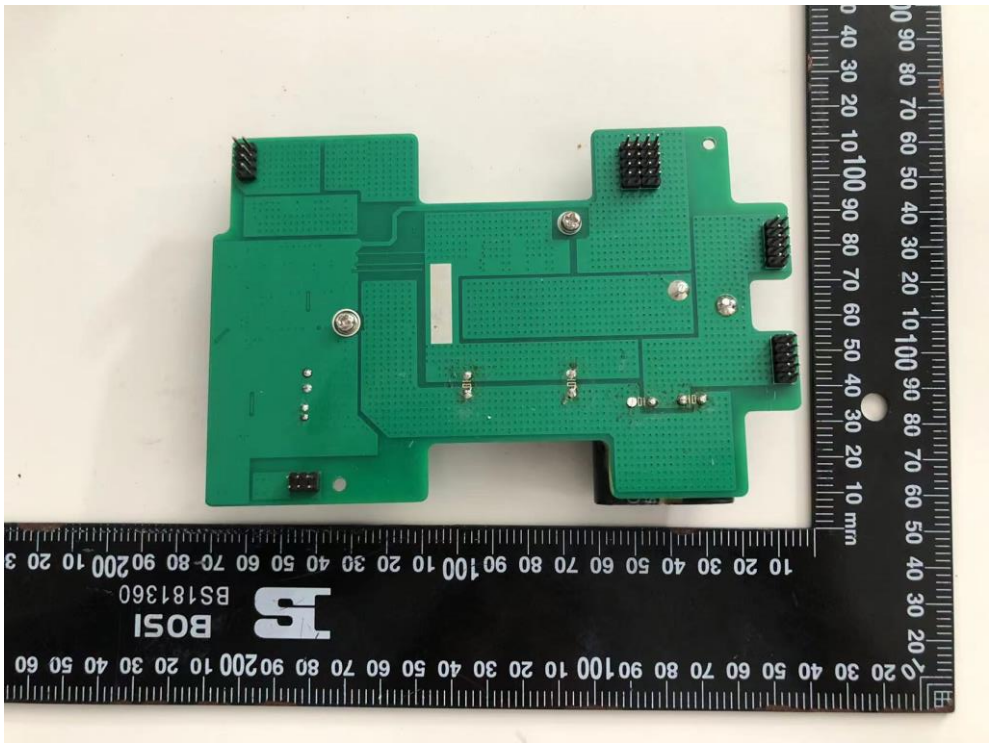




Attachment 1 Photo documentation

BMS





Attachment 2 Information for safety

6. 贮存维护与运输 Storage, Maintenance and Transportation

6.1. 贮存 Storage

电池组需长期贮存时，请将电池组充电至 50%左右的电量（放完电后，用充电器（15A）充电 5~6 小时即可），放置于干燥、通风处，每 3 个月用充电器充电 4~5 小时。

When the battery pack to be long-term stored, charge the battery pack to about 50% capacity(after discharging completely, charge for 5 - 6h at 15A),store in dry and ventilated place, charge 4 to 5h for every 3 months.

电池组与充电器应贮存在清洁、干燥、通风处，应避免与腐蚀性物质接触，远离火源及热源。

The battery pack and charger should be stored in clean, dry and ventilated place, avoid contacting with corrosive materials and be away from fire and heat.

6.2. 运输 Transportation

电池组与充电器应包装后进行运输，在运输过程中应防止剧烈振动、冲击或挤压，防止日晒雨淋。可使用汽车、火车、轮船、飞机等交通工具进行运输。

The battery pack and charger should be packaged for transport, prevent excessive vibration, shock or extrusion in transport process and prevent the sun and rain. The battery pack can be transported by cars, trains, ships, aircraft and other vehicles etc.

6.3. 维护 Maintenance

a）电池组贮存时，应以 40%～60%的荷电态贮存。

The battery pack should be stored in 40%～60% charged capacity.

b）电池组长期不使用时，每三个月左右进行补充一次电，用充电器补充 4~5h 即可。

If battery pack is not used for a long period, it should be replenish charging one time for 4 to 5h for every three month.

c）在维护过程中，请勿自行重新装卸电池组中的电池，否则将会引起电池性能的下降。

In the maintenance process, please do not disassemble the battery pack, otherwise it will cause a decline of battery performance.

d）不得擅自拆换电池组中的任何电池，严禁解剖电池。

Forbid to remove any cell in the battery pack. Forbid dissecting battery cells.

Attachment 2 Information for safety

7. 使用电池注意事项 Battery Handling Precautions

* 勿将电池组投入水中或将其弄湿！

Forbid to immerse battery in water or allow it to get wet!

* 禁止在火源或极热条件下给电池组充电！勿在热源（如火或加热器）附近使用或贮存电池组！如果电池泄漏或发出异味，应立即将其从接近明火处移开。第一次使用电池，需将电池充满电后再使用!

Don't charge, use and store battery near a heat source such as fire and heater! If the battery leaks or releases strange odor, pls remove it from place near fire place immediately. Fully charge the battery before first-time using.

* 勿将正负极接反！

Forbid to reverse the positive and negative pole!

* 勿将电池组投入火中或给电池组加热!

Forbid to throw the battery pack into fire or heat it!

* 禁止用导线或其他金属物体将电池组正负极短路！

Forbid to short-circuit battery with wire or other metal objects!

* 禁止用钉子或其他尖锐物体刺穿电池组壳体，禁止锤击或脚踏电池组！

Forbid to nail, knock or trample battery!

* 禁止以任何方式分解电池组和电池！

Forbid to disassemble the battery and battery pack in any way!

* 禁止将电池组置于微波炉或压力容器中！

Forbid to put the battery into microwave oven or pressure vessel!

* 如果电池组发出异味、发热、变形、变色或出现其他任何异常现象时不得使用；如果电池组正在使用或充电，应立即从用电器或充电器上取出并停止使用！

If the battery pack gives off odor, gets heat, deformation, discoloration or appears any abnormal phenomenon, stop using it; please remove the battery from electrical appliances and stop using it, when the battery is being used or charged!

* 不能使用处于极热环境中的电池组，如阳光直射或热天的车内。否则，电池组会过热，这样就会影响性能、缩短电池组的使用寿命!

Forbid to use battery pack in a very hot environment, such as under direct sunlight or in car on hot day. Otherwise, the battery pack will overheat, which will affect battery performance and shorten battery life!

* 如果电池漏液后电解液进入眼睛，不要擦，应立即用水冲洗，立即寻求医疗救助。如不及时处理，眼睛将会受到伤害!

Attachment 2 Information for safety

If the battery leaks and electrolyte leakage enters into the eyes, do not rub, rinse with water immediately and seek immediate medical assistance. If not in time, eyes will be hurt!

* 环境温度会影响放电容量，环境温度超出标准环境时（25±5℃），放电容量会有所降低!

Ambient temperature will affect the discharge capacity, if the ambient temperature is beyond the standard environment (25±5℃), the discharge capacity will drop!

特别注意事项 Special Considerations:

* 电池组在充电过程中，如果出现异味、异常声响，请立即停止充电。

During charging, if there is odor and unusual noise, immediately stop charging.

* 电池组在放电过程中，如果出现异味、异常声响，请立即停止放电。

During discharging, if there is odor, unusual noise, immediately stop discharging.

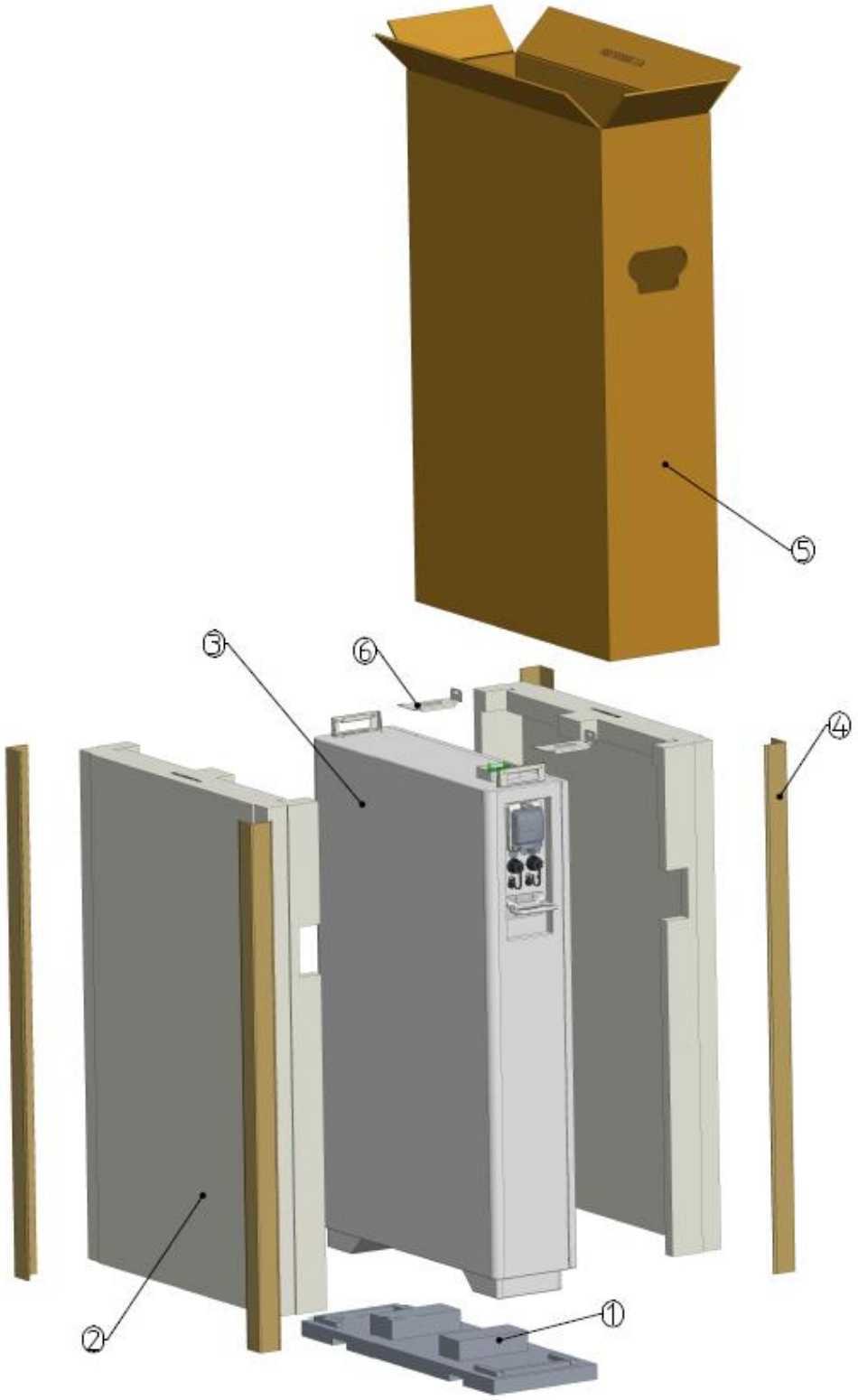
* 如果出现上述现象，请与厂家联系，请勿私自拆卸。If there are above phenomenon, please contact the manufacturer, do not disassemble by yourself.

* 废弃锂电池应按照当地法规要求回收处置。Waste lithium batteries should be recycled and disposed in accordance with local laws.

- - - End of Attachment 2 - - -

Attachment 3 Packaging

Packing Schematic Diagram



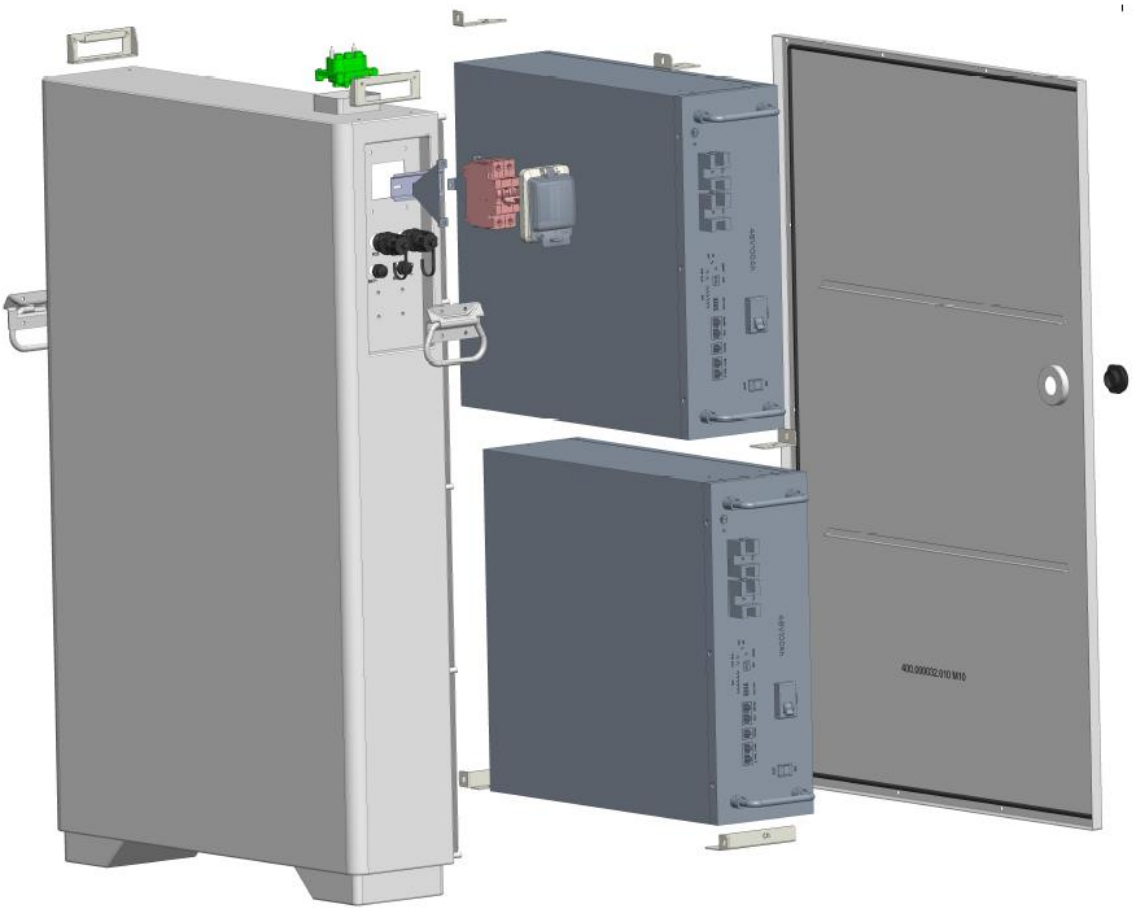
- - - End of Attachment 3 - - -

Attachment 4 Product specification

Specification of Battery

Model	M10
Product description	Rechargeable Li-ion Battery Pack
Rated voltage	96 V
Rated capacity	100 Ah
Operating voltage range	81 V - 108 V
Standard charging mode	Charge with constant current 50 A until the voltage reaches 108 V, then charge with constant voltage 108 V until the current reaches 5 A.
Maxium charging current	50 A
Maxium discharging current	50 A
Operating temperature range	Charge: 0-45 °C Discharge: -20-55 °C
Weight	Approx. 90 kg

Construction diagram of the battery



- - - End of Attachment 4 - - -