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. ..... :	6133585.50A
Date of issue..... :	2022-06-21
Total number of pages ..... :	25 pages
Name of Testing Laboratory preparing the Report..... :	DEKRA Testing and Certification (Shanghai) Ltd.
Applicant's name..... :	AKKU SYS Akkumulator- und Batterietechnik Nord GmbH
Address..... :	Verbindungsweg 23, 25469 Halstenbek, Germany
Test specification:	
Standard ..... :	IEC 62619: 2017
Test procedure ..... :	CB Scheme
Non-standard test method ..... :	N/A
Test Report Form No. ..... :	IEC62619A
Test Report Form(s) Originator.... :	UL(Demko)
Master TRF..... :	Dated 2018-06-07

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.

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Test item description..... :	Rechargeable LiFePO4 Battery System
Trade Mark..... :	a-TroniX
Manufacturer..... :	WUXI WATTSONIC ENERGY TECHNOLOGY CO., LTD
Model/Type reference..... :	See the next page
Ratings..... :	See the next page

Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):			
☒	**CB Testing Laboratory:**	DEKRA Testing and Certification (Shanghai) Ltd.	
Testing location/ address.....:		3F., #250 Jiangchangsan Road, Building 16, Headquarter Economy Park Shibei Hi-Tech Park, Jing'an District, Shanghai, 200436, China	
Tested by (name, function, signature).....:		Cole Qian, Engineer	Cole Qian
Approved by (name, function, signature)...:		Louis Kang, Reviewer	Louis Kang
☐	**Testing procedure: CTF Stage 1:**		
Testing location/ address.....:			
Tested by (name, function, signature).....:			
Approved by (name, function, signature)...:			
☐	**Testing procedure: CTF Stage 2:**		
Testing location/ address.....:			
Tested by (name + signature) .....:			
Witnessed by (name, function, signature)..:			
Approved by (name, function, signature)...:			

Sample information:

Model Type	**a-TroniX Storagepower 4.6KWh**	**a-TroniX Storagepower 6.9KWh**	**a-TroniX Storagepower 9.2KWh**	**a-TroniX Storagepower 11.5KWh**
Nominal Energy	4,6 kWh	6,9 kWh	9,2 kWh	11,5 kWh
Nominal Voltage	153,6 Vdc	230,4Vdc	307,2 Vdc	384 Vdc
Voltage Range	144-175,2 Vdc	216-262,8 Vdc	288-350,4 Vdc	360-438 Vdc
Model Type	**a-TroniX Storagepower 13.8KWh**	**A-TroniX Storagepow-er16.1KWh**	**a-TroniX Storagepower 18.4KWh**	**a-TroniX Storagepower 20.7KWh**
Nominal Energy	13,8 kWh	16,1 kWh	18,4 kWh	20,7 kWh
Nominal Voltage	460,8 Vdc	537,6 Vdc	614,4 Vdc	691,2 Vdc
Voltage Range	432-525,6 Vdc	504-613,2 Vdc	576-700,8 Vdc	648-788,4 Vdc

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

Attachment 1: photos (5 pages)

Summary of testing:

Tests performed (name of test and test clause):	**Testing location:**
Report 6116529.50 All applicable tests were performed on BMS and module SOL-R24-2.3KWH, —7.2.3.3 Edge and corner drop 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). the test results comply with the requirement of IEC 62619:2017. **Report 6133585.50A** No testing	DEKRA Testing and Certification (Shanghai) Ltd. 3F, #250 Jiangchangsan Road, Building 16, Headquarter Economy Park Shibei Hi-Tech Park, Jing'an District, Shanghai, 200436, China SRF testing and certification (Changzhou) Co., LTD. No. 27 Chuangzhi Road, Kunlun Street, Liyang City, Jiangsu China.

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

N/A

☒ **The product fulfils the requirements of EN 62619:2017**

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.

a-tronix

Rechargeable LiFePO4 Battery System

Model Type	☐a-TroniX Storagepower 4,6kWh	☐a-TroniX Storagepower 6,9kWh	☐a-TroniX Storagepower 9,2kWh	☐a-TroniX Storagepower 11,5kWh	☐a-TroniX Storagepower 13,8kWh	☐a-TroniX Storagepower 16,1kWh	☐a-TroniX Storagepower 18,4kWh	☐a-TroniX Storagepower 20,7kWh
Battery Designation	IFpP/10/161/234[(24S)2S]M/-10+50/95	IFpP/10/161/234[(24S)3S]M/-10+50/95	IFpP/10/161/234[(24S)4S]M/-10+50/95	IFpP/10/161/234[(24S)5S]M/-10+50/95	IFpP/10/161/234[(24S)6S]M/-10+50/95	IFpP/10/161/234[(24S)7S]M/-10+50/95	IFpP/10/161/234[(24S)8S]M/-10+50/95	IFpP/10/161/234[(24S)9S]M/-10+50/95
Nominal Energy	4.6KWh	6.9KWh	9.2KWh	11.5KWh	13.8KWh	16.1KWh	18.4KWh	20.7KWh
Nominal Voltage	153.6Vdc	230.4Vdc	307.2Vdc	384Vdc	460.8Vdc	537.6Vdc	614.4Vdc	691.2 Vdc
Voltage Range	144-175.2Vdc	216-262.8Vdc	288-350.4Vdc	360-438Vdc	432-525.6Vdc	504-613.2Vdc	576-700.8Vdc	648-788.4Vdc
Weight	71KG	99KG	127KG	155KG	183KG	211KG	239KG	267KG
Capacity		30Ah		Ingress Protection		IP21		
Max Charge/ Discharge Current		30A/30A						
Protective Class		I	Operation Temparature		-10-50℃			
			Storage Temperature		-20-60℃			
SN		ST6545181029181000131						

Risk of fire and burn.
Refer to the user manual before using the battery.

ELECTRONIC DEVICE: DO NOT THROW AWAY

Proper disposal of batteries is required. Refer to your local codes for disposal requirements.

CE UN38.3

Service: AKKU SYS Akkumulator- und Batterietechnik Nord GmbH Tel.: +49 (0) 4101 376 760
Verbindungsweg 23, 25469 Halstenbek, Germany

Remark:

1. Refer to Clause 5 of IEC 62620:2014.
2. Date of manufacture is included in SN.

Test item particulars .....:	Rechargeable LiFePO4 Battery System
Classification of installation and use.....:	Rechargeable LiFePO4 Battery System for electrical energy storage system
Supply Connection .....:	DC connection
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..... :	2021-10-08
Date (s) of performance of tests ..... :	2021-10-11 to 2021-10-15

General remarks:

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

The measurement result is considered in conformance with the requirement if it is within the prescribed limit, It is not necessary to calculate the uncertainty associated with the measurement result. This report is not used for social proof in China market.

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)..... :	WUXI WATTSONIC ENERGY TECHNOLOGY CO., LTD. B1-416, NO. 200 Linghu Road, Xinwu District, Wuxi 214100, China

General product information and other remarks:

The product covered by this report is Rechargeable LiFePO4 Battery System, including 2-9 modules. The module type a-TroniX Storagepower 2,3kWh Batterie, including 24 cells in series and BMS.

1. Details information of the battery pack, as following:

Items	**Specification**
Battery pack model	a-TroniX Storagepower 2,3kWh Batterie
Battery pack designation	IFpP/10/161/234[24S]M/-10+50/95
Nominal voltage(Vdc)	76,8
Rated capacity(Ah)	30
Upper limit charge voltage(Vdc)	87,6
Upper limit charge current(A)	30
Charging temperature range(℃)	-10-50
Cut-off voltage(Vdc)	72
Cells used in the battery assembly have closely matched capacities, are of the same design, and are of the same chemistry and same manufacturer.	

2. The cell type 92161227LFP-30Ah was tested according to IEC 62619:2017 in CB report no. 210302706SHA-001 issued by Intertek Testing Services Shanghai on 2021-04-22 with CB certificate no. SE-104781 issued by Intertek on 2020-05-06.

3. After confirmed with applicant, A battery system is composed of BMS and (2-9) modules, a small system consisting of a single module +BMS replaces battery system for evaluation. The applicant had clearly declared the tested a single module +BMS had all protective functions which are identical to battery system.

Amendment report 6133585.50A:

The report 6133585.50A was based on the CB report 6116529.50 issued by DEKRA Testing and Certification (Shanghai) Ltd.,issued on 2021-11-18, and CB certificate No.: NL-77526 issued by DEKRA Certification B.V., issued on 2021-11-19. It was issued due to below modifications:

1. Applicant's name was changed from WUXI WATTSONIC ENERGY TECHNOLOGY CO., LTD to AKKU SYS Akkumulator- und Batterietechnik Nord GmbH, updated address accordingly;
2. Trade name was changed from wattsonic to a-TroniX, updated marking;
3. Change the battery system model name see page 3;
4. Change the battery pack model name see page 7;
5. Updated the photos.

After technical review, no tests were considered necessary; see the "summary of testing".

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…:	See also table 5.1 for Critical components information	P
5.2	**Insulation and wiring**		**P**
	Voltage, current, altitude, and humidity requirements		P
	Adequate clearances and creepage distances between connectors		P
	The mechanical integrity of internal connections		P
5.3	**Venting**		**P**
	Pressure relief function		P
	Encapsulation used to support cells within an outer casing		P
5.4	**Temperature/voltage/current management**		**P**
	The design prevents abnormal temperature-rise		P
	Voltage, current, and temperature limits of the cells		P
	Specifications and charging instructions for equipment manufacturers		P
5.5	**Terminal contacts of the battery pack and/or battery system**		**P**
	Polarity marking(s)		P
	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 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
	The voltage control for series-connected batteries		P

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Clause	Requirement + Test	Result - Remark	Verdict
5.7	**Operating region of lithium cells and battery systems for safe use**		**P**
	The cell operating region.....:	Upper charging limit: 3,65 Vdc Max charging current: 30 A	P
	Designation of battery system to comply with the cell operating region		P
5.8	**Quality plan**		**P**
	Manufacturing quality plan (for example: ISO9001, etc.) prepared and implemented.....:	ISO9001:2015 certificate provided.	P
	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 IEC62619)		P
	Capacity confirmation of the cells or batteries		P
	Default ambient temperature of test, 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		P
	The cells or batteries charged using the method specified by the manufacturer .....:	CC/CV	P
7.2	**Reasonably foreseeable misuse**		**P**
7.2.1	External short-circuit test (cell or cell block)		N/A
	Short circuit with total resistance of 30 mΩ ± 10 mΩ at 25 °C ± 5 °C		N/A
	Results: no fire, no explosion		N/A
7.2.2	Impact test (cell or cell block)		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

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Clause	Requirement + Test	Result - Remark	Verdict
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) ..... :		—
	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 system	—
	Mass of the test unit (kg) ..... :	28	—
	Height of drop (m) ..... :	0,1	—
	Results: no fire, no explosion		P
7.2.4	Thermal abuse test (cell or cell block)		N/A
	Results: no fire, no explosion		N/A
7.2.5	Overcharge test (cell or cell block)		N/A
	For those battery systems that are provided with only a single protection for the charging voltage control		—
	Results: no fire, no explosion ..... :	See Table 7.2.5.	N/A
7.2.6	Forced discharge test (cell or cell block)		N/A
	Upper limit charge voltage of the cell ..... :		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, I_m ..... :		N/A
	Discharge current for forced discharge, 1.0 It ..... :		N/A
	Discharging time, t = (1 It / I_m) x 90 (min.) ..... :		N/A
	Results: no fire, no explosion ..... :	See Table 7.2.6.	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)		N/A
	Samples preparation procedure: a), in accordance with 8.3.9 of IEC62133:2012; or b), the nickel particle inserted before charging, or c), the nickel particle was inserted before electrolyte filling ..... :	Refer to the CB report of cell	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Tested according to Cl. 8.3.9 of IEC 62133:2012 test method, except all tests were carried out in an ambient temperature of 25 °C ± 5 °C.		N/A
	The appearance of the short-circuit location recorded by photograph or other means..... :	Refer to the CB report of cell	—
	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, no explosion ..... :	See Table 7.3.2.	N/A
7.3.3	**Propagation test (battery system)**		**N/A**
	Method to create a thermal runaway in one cell ... :	See Annex B	N/A
	Results: No external fire from the battery system or no battery case rupture..... :	See results in Table 7.3.3	N/A
8	**BATTERY SYSTEM SAFETY (CONSIDERING FUNCTIONAL SAFETY)**		**P**
8.1	**General requirements**		**P**
	Functional safety analysis for critical controls	Functional safety analysis according to Annex H of IEC 60730-1 was considered in the test report 6116529.51QS, 6116529.52QS issued by DEKRA Testing and Certification (Shanghai) Ltd.	P
	Conduct of a process hazard, 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		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) ..... :	Full battery system	N/A
	Results: no fire, no explosion ..... :	See Table 8.2.2.	P
	The BMS interrupted the overcharging before reaching 110% of 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

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Clause	Requirement + Test	Result - Remark	Verdict
	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+5	P
	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	**INFORMATION FOR SAFETY**		**P**
	The cell manufacturer provides information about current, voltage and temperature limits of their products		P
	The battery system manufacturer provides information regarding how to mitigate hazards to equipment manufacturers or end-users.		P
10	**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.		P
	Cell or battery system has clear and durable markings		P
	Cell designation		N/A
	Battery designation		P
	Battery structure formulation		N/A

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Clause	Requirement + Test	Result - Remark	Verdict

ANNEX A	**OPERATING REGION OF CELLS FOR SAFE USE**		**P**
A.1	General		P
A.2	Charging conditions for safe use		P
A.3	Consideration on charging voltage		P
A.4	Consideration on temperature		P
A.5	High temperature range		P
A.6	Low temperature range		P
A.7	Discharging conditions for safe use		P
A.8	Example of operating region		P

ANNEX B	**PROCEDURE OF 7.3.3 PROPAGATION TEST**		**N/A**
B.1	General		N/A
B.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.....:		—
B.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 C	**PACKAGING**		**P**
	The materials and pack design chosen in such a way as to prevent the development of unintentional electrical conduction, corrosion of the terminals and ingress of environmental contaminants		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)]**
Master board					
BMS	WUXI WATTSONIC ENERGY TECHNOLOGY CO., LTD	02MBV10R04 (Hardware version: 02MBV10R04) (Software version: 04)	Overcharge detection voltage for each battery: 86,4 Vdc, Overcharge detection voltage for each cell: 3,65 Vdc, Overdischarge detection voltage for battery: 67,2 Vdc, Overdischarge detection voltage for each cell: 2,8 Vdc, Charge overcurrent detection current: 30 A, Discharge overcurrent detection current: 30 A, High temperature protection: 45 °C, Low temperature protection: -30 °C.	IEC 62619: 2017	Tested with appliance
MCU (U17)	Giga Device	GD32F305VCT6	Core: ARM 32-bit M3 CPU Fash: 256 Kbytes Operating voltage: 2-3,6 V LQFP T_A: -40 to 85 °C	IEC 62619: 2017	Tested with appliance
Contactor (RY1,RY2, RY3, RY4, RY5)	SANYOU CORPORATION LIMITED	SJ-S-124DMH	10 A, 250 Vac Ta: -40 to 105 ℃	IEC 62619: 2017	Tested with appliance
Isolation Amplifier (U13)	Texas Instruments	AMC1200SDUB	1200 Vac V_{DD1}: 4.5 -5,5 V V_{DD2}: 2.7-5,5 V T_A: -40 to 105 °C	IEC 62619: 2017	Tested with appliance

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Clause	Requirement + Test	Result - Remark	Verdict

Optocoupler (U1, U3)	Vishay Semiconductors	TCLT1007	V_{IOWM}: 600 V_{RMS} T_A: -40 to 100 °C	IEC 62619: 2017	Tested with appliance
Y1 capacitor (C6)	DONGGUAN CITY DERSONIC ELECTRONIC CO LTD.	Y1	1nF, Y1 Lower Temp:-40 °C Upper Temp:125 °C	IEC 62619: 2017	Tested with appliance
MOSFET (Q2, Q4, Q5)	Vishay Siliconix	IRFBG30	V_{DS}: 1000 V V_{GS}: ±20 V I_D: 3,1 A (T_A=25 °C) T_J: -55 to 150 °C	IEC 62619: 2017	Tested with appliance
Slave box					
Cell	Sichuan Lvxin Power Technology Co., Ltd.	92161227LFP-30Ah	3,2 Vdc, 30 Ah, Li-ion	IEC 62619: 2017	Intertek CB cert. SE-104781
Metal Enclosure	WUXI WATTSONIC ENERGY TECHNOLOGY CO., LTD	SOL-R24-2.3KWH	--	IEC 62619: 2017	Tested with appliance
PCB	SHANGHAI GLOBAL ELECTRONIC MATERIAL LTD	GEM-R1	V-0, 130 °C	IEC 62619: 2017	Tested with appliance
AFE (U16, U26)	Texas Instruments	BQ7694003DBT	Supply voltage: 6-25 Vdc Topr: -40 to 85 °C	IEC 62619: 2017	Tested with appliance
MCU (U17)	Giga Device	GD32F103CBT6	Core: ARM 32-bit M3 CPU Fash: 64 Kbytes Operating voltage: 2-3,6 V LQFP T_A: -40 to 105 °C	IEC 62619: 2017	Tested with appliance
Isolated CAN Transceiver (U19)	Texas Instruments	ISO1050DW	V_{rms}: 5000 V V_{cc1}: 3-5,5 V V_{cc2}: 4,75-5,25 V T_A: -55 to 105 °C	IEC 62619: 2017	Tested with appliance
Optocoupler (U24)	Vishay Semiconductors	TCLT1007	V_{IOWM}: 600 V_{RMS} T_A: -40 to 100 °C	IEC 62619: 2017	Tested with appliance
NTC (T1 to T8)	Shenzhen Mintile Electronics Co., Ltd	MT-9S103FA2076B-0800	R25=10 K, R+-1%,	IEC 62619: 2017	Tested with appliance

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict

Precharged contactor	Nanjing Shagon Electronics Co., Ltd	RX(G)24	250 W,10 A	IEC 62619: 2017	Tested with appliance
Voltage sampling wire	KUNSHAN HANJIANG CABLE CO LTD	1569	20 AWG, VW-1 105°C, 300 Vac	IEC 62619: 2017	Tested with appliance
Temperature sampling wire	DONGGUAN ZHENGWEI ELECTRIC WIRE & CABLE INDUSTRY CO LTD	2651	24 AWG, VW-1 105 °C, 300 Vac	IEC 62619: 2017	Tested with appliance
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): _____

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): __

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 Tempera-ture, (°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 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 battery system, (Vdc)**	**Maximum Charging Current, (A)**	**Max. Charging Voltage, (V dc)**	**Max. Voltage of battery system, (Vdc)**	**Results**
2021100002-002	73,24	30	96,36	88,36	A, D, F

	Charge Voltage Applied Battery System: 1)	
	Whole	**Part**
	☑	

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): ___

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**
2021100002-002	72,64	36	87,6	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): ____

IEC 62619			
Clause	Requirement + Test	Result - Remark	Verdict

8.2.4	TABLE: Overheating control (battery system)		P
Sample No.	**OCV at start (SOC 50%) of test, V dc**	**Maximum Charging Current, A**	**Maximum Charging Voltage, V dc**
2021100002-002	79,51	30	87,6
Maximum Specified Temperature of Battery System, °C		**Maximum Measured Cell Case Temperature, °C**	**Results**
50+5		50,3	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): ____

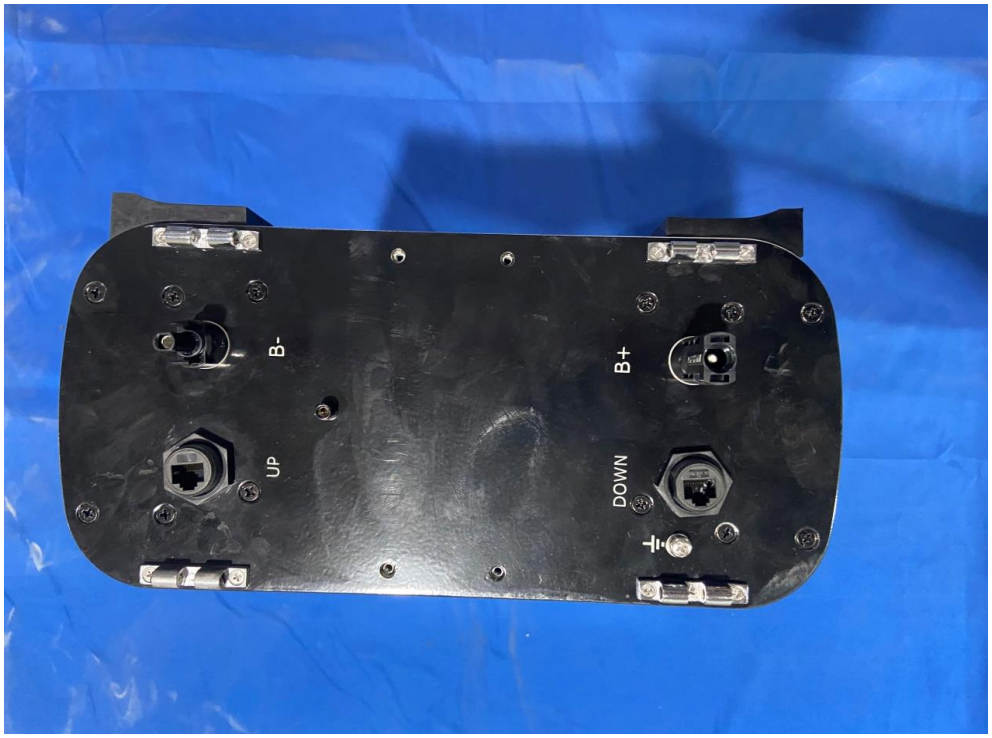
Attachment 1: photos

Overview

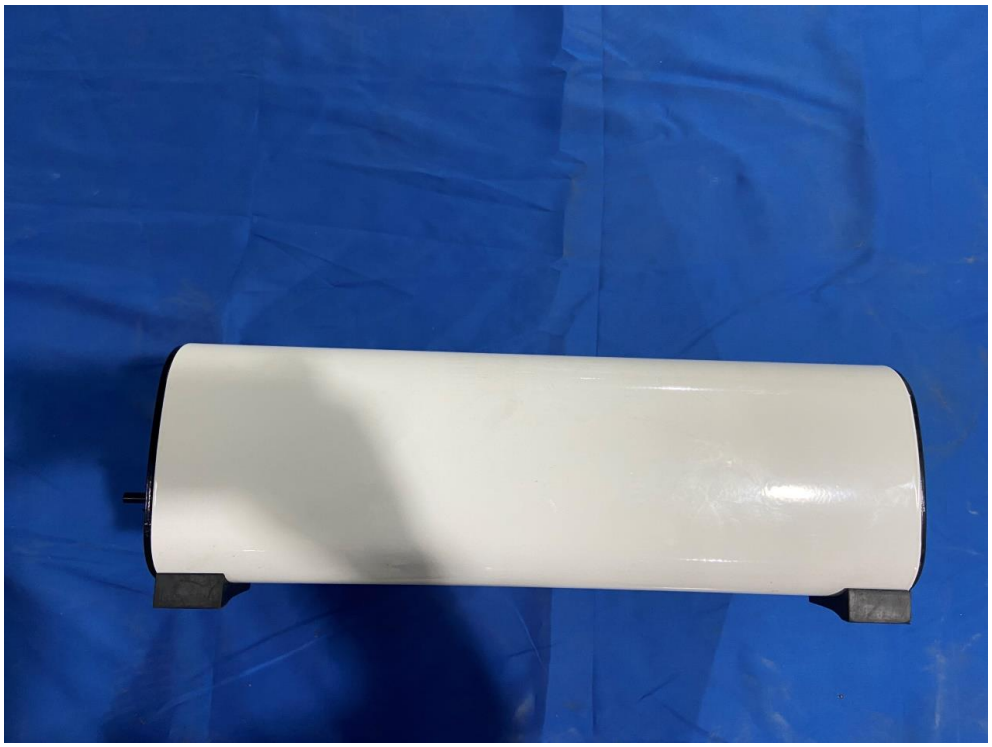
Overview

Overview

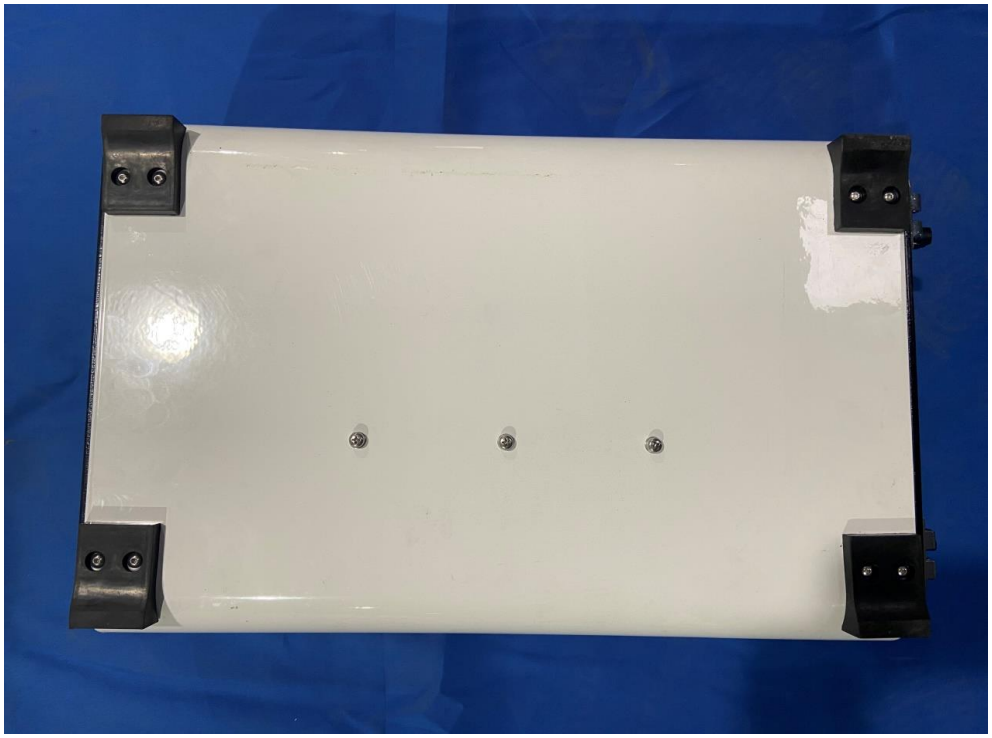
Overview



Overview

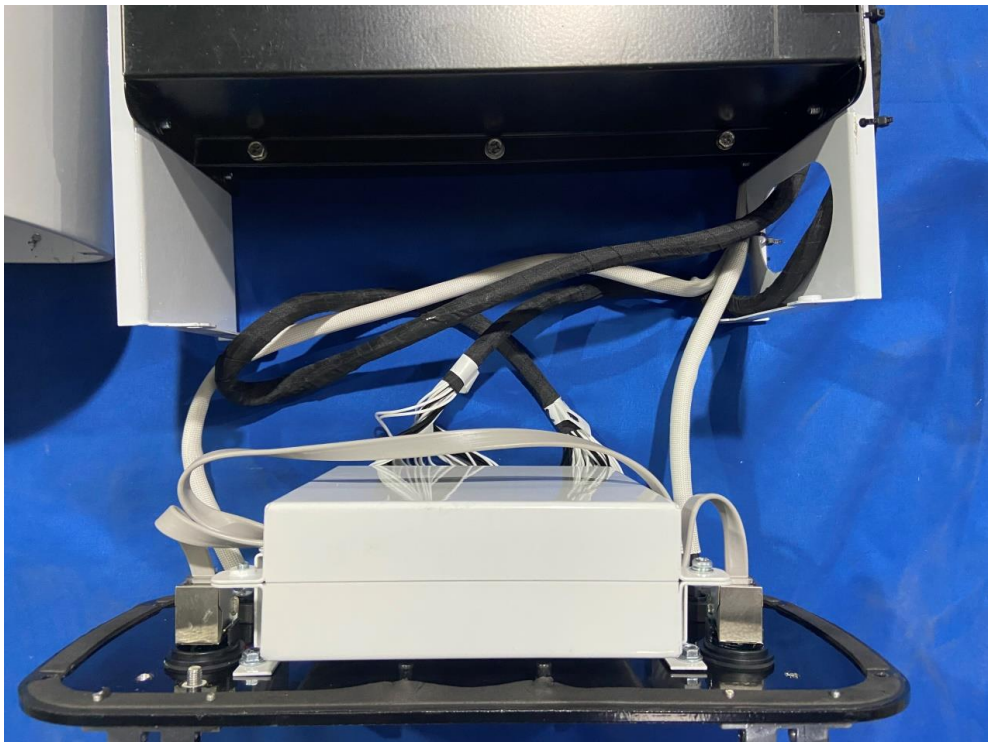


Overview



Overview

Internal view



Cell view

----------END----------