

Outdoor Liquid Cooling BESS Cabinet

Product Specification

(GSL-BESS-232K)

232.96kwh -832V 280AH



SHENZHEN GSL ENERGY CO.,LTD

Head Office: A503, Building 1, Tianan Cyber Park, Long Gang Central City, Shenzhen, Guangdong, China

Factory: Building #2, 58 Xinjian Rd., St. Qiuchang, Huiyang Dist. Huizhou, Guangdong, China

Revision history

No.	Version	Details	Date	Prepared by	Reviewed by	Approved by
1	1.0	New added	2024.08.18	Li Xin	Yu Chen	Liu Si
2		Blank below				
3						
4						

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1 Application Range

This product specification specifies the performance indicators ,transportation and storage requirements, use conditions, precautions and risk warnings of the lithium iron battery power station produced by SHENZHEN GSL Energy Co.,Ltd (hereinafter referred to as GSL ENERGY) for energy storage scenarios.

2 Implementation Standards

For dated references, dated versions only apply to this document. For undated references, the latest version (including all amendments)of this document applies.

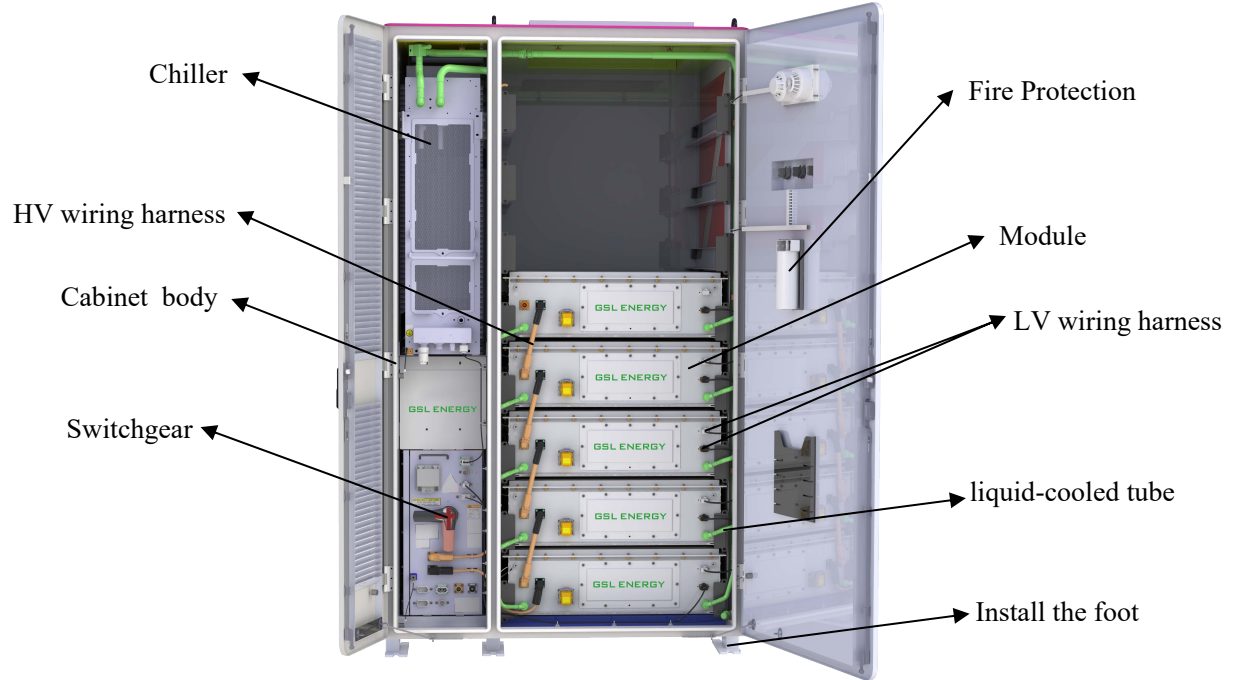
No.	Standard number	Standard name
1	IEC 62477-1-2022	Safety requirements for power electronic converter systems and equipment
2	IEC 62619-2022	Secondary cells and batteries containing alkaline or other non-acid electrolytes-Safety requirements for secondary lithium cells and batteries,for use in industrial applications
3	IEC 62933-5-2	Unit parameters and testing methods–Application and performance testing
4	IEC63056-2020	Secondary cells and batteries containing alkaline or other non-acid electrolytes–Safety requirements for secondary lithium cells and batteries for use in electrical energy storage systems
5	UL1973-2022	Batteries For Use In Light Electric Rail(LER)Applications And Stationary Applications
6	UL9540A-2020	STANDARD FOR SAFETY:Test Method for Evaluating Thermal Runaway Fire Propagation in Battery Energy Storage Systems
7	UN38.3	United Nations Manual of Tests and Standards for the Transport of Dangerous Goods,Part III,paragraph 38.3
8	IEC61000-6-2–2016	Generic standards–Immunity standard for industrial environments
9	IEC61000-6-4–2018	Generic standards–Emission standard for industrial environments
10	GB/T 36276-2018	Lithium ion battery for electrical energy storage

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3 Components



Cabinet diagrammatic sketch

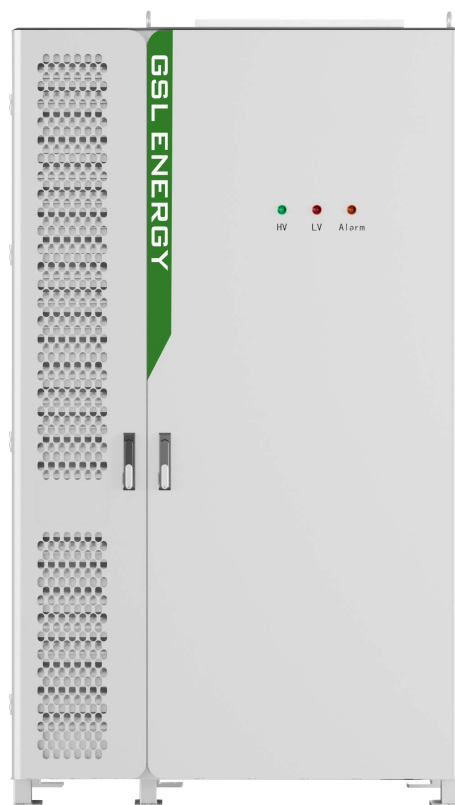
No.	Components	Amounts	Remarks
1	Module	5	1P52S/module
2	Switchgear	1	/
3	Chiller	1	8kW
4	Cabinet	1	1.69m ²
5	Fire Protection	1	/

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4 System Technical Specification



No.	Items	Spec.	Remark
1	Product Code	GSL ENERGY	/
2	Configuration	1P260S	/
3	Rated Energy	232.96kWh	100%DOD-25°C-0.5C
4	Rated Voltage	832V	/
5	Operating Voltage Range	650~949V	For cell 2.6V~3.6V
6	Dimension	1300mm×1300mm×2340mm	D*W*H
7	Mass	≤2500kg	/
8	Altitude	≤3000m	/

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9	Environment temperature	-30°C~55°C	/
10	Environment temperature	5%~90%RH	/
11	Rated charge current	140A	/
12	Rated discharge current	140A	/
13	Pulse charging current	280A	≤1min
14	Pulse charging current	280A	≤1min
15	Temperature in cabinet	-20~50°C	/
16	IP level of cabinet	Bat.Compartment: IP56 Electric Compartment: IPX4	/
17	Efficiency	≥92%	/
18	Insulation standard	≥1000Ω/V	Test voltage 1000Vdc
19	Withstand voltage	4414VDC,leakage current≤2mA,no breakdown or flashover	/
20	Thermal management	Liquid cooling/heating	/
21	Refrigerating Capacity	8kW@45°C _{et}	Compressor: 3.5kW
22	Heating Capacity	3kW	PTC: 3kW
23	Auxiliary power supply	Aver:3.35kW Max:5.2kW	Including BMS and cooling system
24	Communication protocol	CAN	/

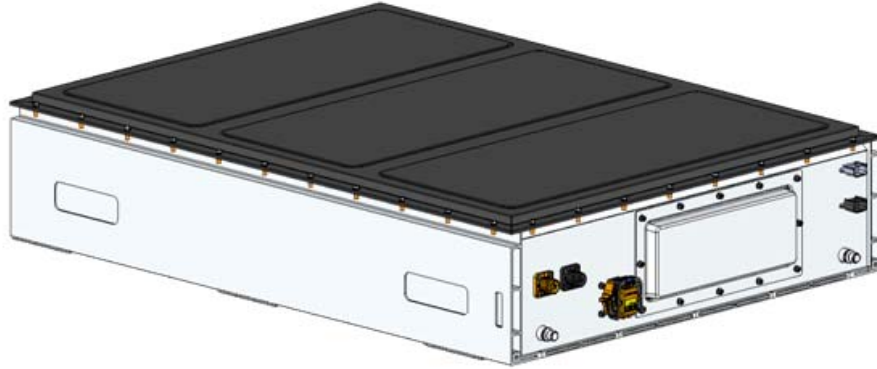
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5 Product Introduction

5.1. Module technical specifications



Module diagrammatic sketch

No.	Items	Spec.	Remarks
1	Integration form	1P52S	/
2	Rated capacity	280Ah	/
3	Rated energy	46.592 kWh	/
4	Rated voltage	166.4V	/
5	Operating voltage range	130V~189.8VV	/
6	Recommended voltage range	148.6~187.2V	/
7	Dimensions	1132±3mm×812±3mm×238±2mm(L*W*H)	/
8	Mass	330±5kg	/
9	Continuous charging current	140A	/
10	Continuous discharging current	140A	/
11	Charging temperature range	0~55°C	/

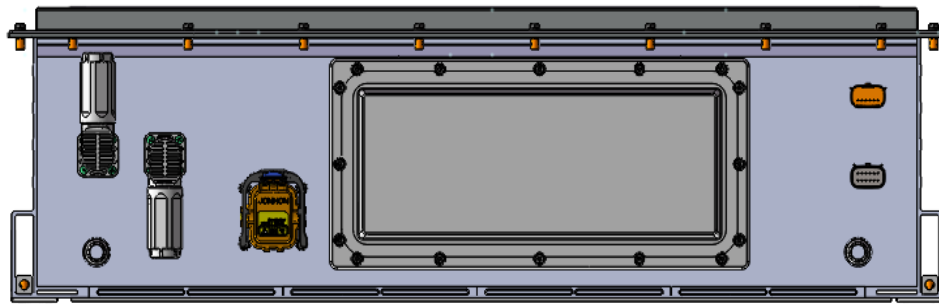
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12	Discharge temperature range	-20~55°C	/
13	Insulation	> 1000Ω/V, 2500VDC	/
14	Withstand voltage	4414VDC, Leakage current < 2mA no breakdown,no flashover	/
15	Thermal management	Liquid cooling/heating	/

5. 1. 1. Module interface





Connector layout

No.	Components	Model	Amount	Remarks
1	B+	C10-779622-0301(Orange)	1	Module HV input+
2	B-	C10-779622-1302(Black)	1	Module HV input-
3	JB1	MOLEX 477259040	1	Rack to Rack
4	JB2	MOLEX 477259010	1	Rack to Rack
5	MSD	Socket: DLQ4B-Z-B Plug: DLQ4B-T	1	Disconnect HV output

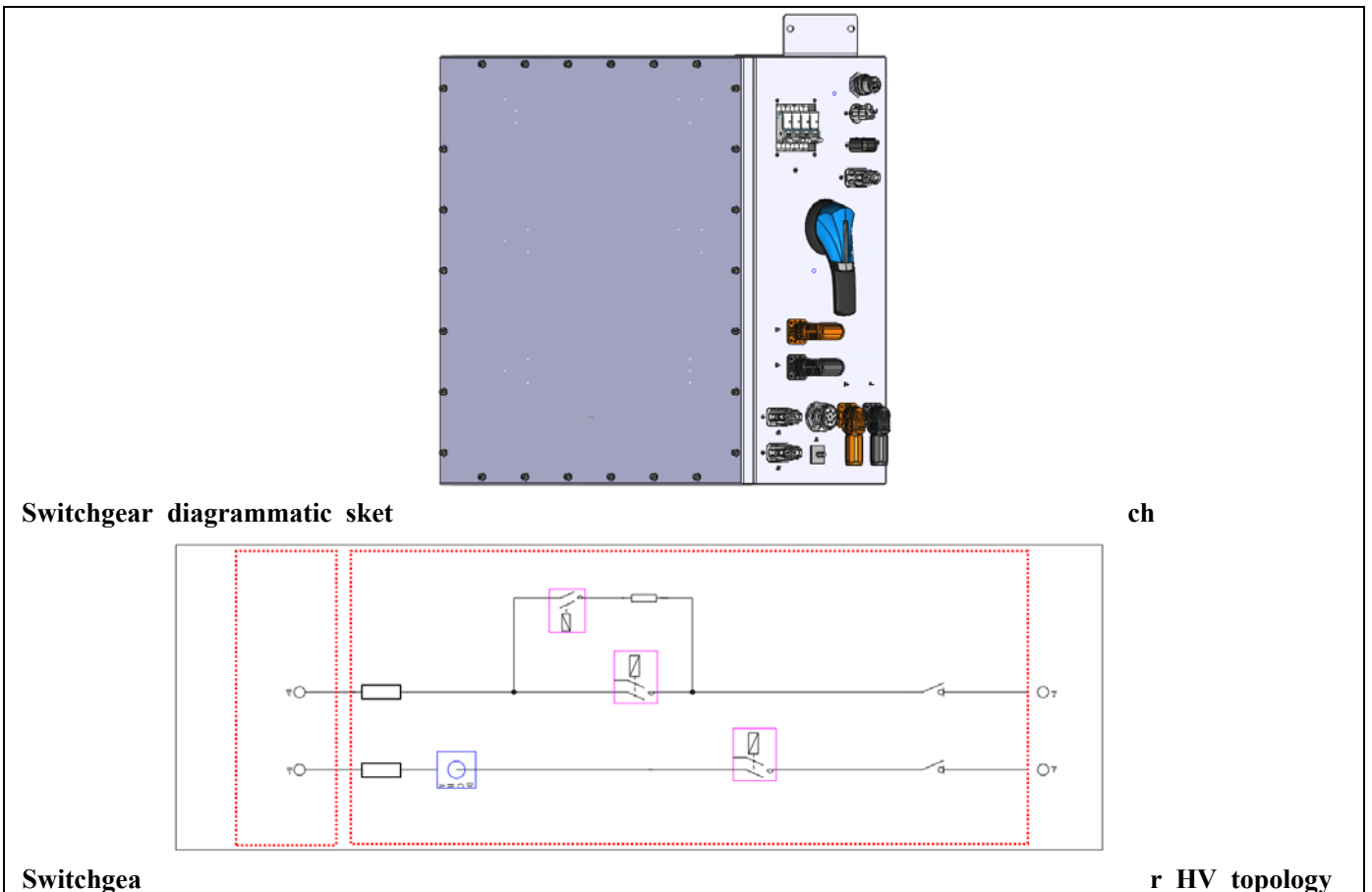
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6	Water inlet & outlet	<p>internal diameter: 12mm</p>  <p>external diameter: 21.5mm</p> 	1	Inlet and outlet diameter is consistent
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5.2. Switchgear technical specifications



No.	Items	Spec.	Remarks
1	Dimension(mm)	600W×600D×286H	/
2	Mass(kg)	45±1kg	/
3	LV Input	24VDC	18~32V
4	HV Input	1331.2VDC	1164.8~1497.6V
5	HV Output	1331.2VDC	1164.8~1497.6V
6	Operating temperature	-30~60°C	/
7	Current sampling accuracy	±1%FSR	/
8	Voltage sampling accuracy	±1%FSR	/
9	LV Power dissipation	≤50W	Cabinet
10	IP level	IP65	/

5. 2. 1. Switchgear interface



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Connector layout

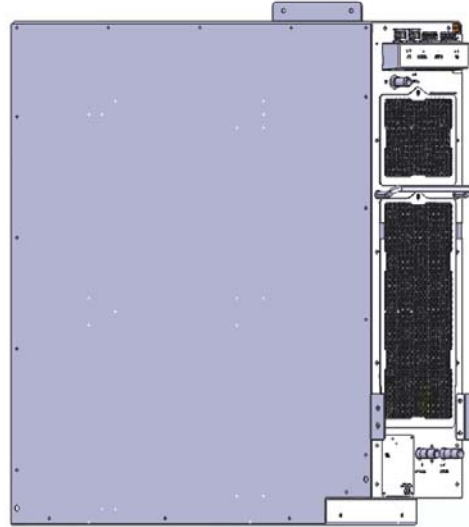
No.	Components	Model	Amounts	Remarks
1	B+	C10-779622-0301(Orange)	1	HV input+
2	B-	C10-779622-1302(Black)	1	HV input-
3	P+	C10-779622-0301(Orange)	1	HV output+
4	P-	C10-779622-1302(Black)	1	HV output-
5	QF	M9F42106	1	24V Power supply Control
6	QS	87P02026	1	DC circuit disconnecter
7	J1	AT04-4P-PM11	1	To chiller
8	J2	AT04-12PA-PM05	1	Cabinet to cabinet
9	J3	AT04-12PB-PM05	1	Cabinet to cabinet
10	J4	477259040	1	To module
11	J7	AT04-12PC-PM05	1	To indicator and detector
12	HR	XB4BVB4	1	HV Power on indication
13	HB	XB4BVB6	1	LV Power on indication
14	HO	XB4BVB5	1	Alarm indication

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5. 3. Chiller technical specifications



Chiller diagrammatic sketch

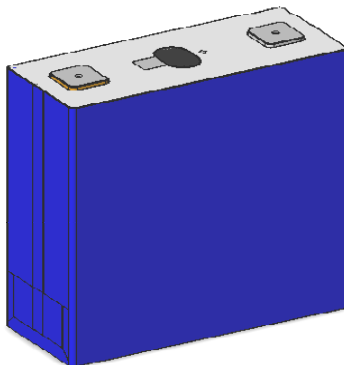
No.	Items	Spec.	Remarks
1	Dimension(mm)	818W×663D×231H	/
2	Mass(kg)	42±1kg	/
3	LV Input	24VDC	18~32V
4	HV Input	1331.2VDC	1164.8~1497.6V
5	HV Output	1331.2VDC	1164.8~1497.6V
6	Operating temperature	-30~60°C	/
7	Current sampling accuracy	±1%FSR	/
8	Voltage sampling accuracy	±1%FSR	/
9	LV Power dissipation	≤35W	Cabinet
10	IP level	IP65	/

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5. 4. Cell technical specifications



Cell diagrammatic sketch

No.	Items	Spec.	Remarks
1	Type	LFP	/
2	Certification	IEC/GB/UL	/
3	Rated capacity (Ah)	280Ah	/
4	Rated voltage (V)	3.2V	/
5	Operating voltage (V)	2.5V~3.65V (Recommend:2.8V~3.6V)	/
6	Rated energy	896Wh	/
7	Maximum continuous Chg/Dchg current	140A	0.5C
8	Maximum pulse Chg/Dchg current	280A	1C@60s
9	DCR (mΩ)	≤0.6mΩ	/
10	Dimensions (W*D*H mm)	71mm*174mm*204mm(T*W*H)	/
11	Mass (Kg)	5.34±0.15kg	/
12	Cycle life (cycle)	8500cycle @ 80%EOL 0.5C/0.5C @25°C	/
13	Energy density (Wh/kg)	170Wh/kg	/
14	Energy efficiency	≥93%	/
15	Operating temperature (°C)	Discharge: -20~55 Charge: 0~55	/
16	Storage temperature (°C)	-30~60°C	

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6 BESS Power Limit Map

6.1. Continuous discharge current matrix (unit:A)

SOC /°C	0%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
-31	0	0	0	0	0	0	0	0	0	0	0	0
-30	0	0	0	16.8	33.6	50.4	84.0	84.0	84.0	84.0	84.0	84.0
-25	0	0	16.8	23.5	33.6	50.4	84.0	84.0	84.0	84.0	84.0	84.0
-20	8.4	16.8	33.6	50.4	84.0	84.0	84.0	84.0	84.0	84.0	84.0	84.0
-15	8.4	16.8	33.6	50.4	84.0	84.0	84.0	84.0	84.0	84.0	84.0	84.0
-10	16.8	33.6	50.4	84.0	84.0	84.0	84.0	84.0	84.0	84.0	84.0	84.0
-5	16.8	50.4	84.0	84.0	84.0	84.0	84.0	84.0	84.0	84.0	84.0	84.0
0	16.8	84.0	84.0	84.0	84.0	84.0	84.0	84.0	84.0	84.0	84.0	84.0
5	16.8	84.0	84.0	168.0	168.0	168.0	168.0	168.0	168.0	168.0	168.0	168.0
10	16.8	84.0	84.0	168.0	168.0	168.0	168.0	168.0	168.0	168.0	168.0	168.0
15	16.8	84.0	84.0	168.0	168.0	168.0	168.0	168.0	168.0	168.0	168.0	168.0
20	16.8	84.0	84.0	168.0	168.0	168.0	168.0	168.0	168.0	168.0	168.0	168.0
25	16.8	84.0	84.0	168.0	168.0	168.0	168.0	168.0	168.0	168.0	168.0	168.0
30	16.8	84.0	84.0	168.0	168.0	168.0	168.0	168.0	168.0	168.0	168.0	168.0
35	16.8	84.0	84.0	168.0	168.0	168.0	168.0	168.0	168.0	168.0	168.0	168.0
40	16.8	84.0	84.0	168.0	168.0	168.0	168.0	168.0	168.0	168.0	168.0	168.0
45	16.8	84.0	84.0	168.0	168.0	168.0	168.0	168.0	168.0	168.0	168.0	168.0
50	16.8	84.0	84.0	168.0	168.0	168.0	168.0	168.0	168.0	168.0	168.0	168.0
55	16.8	84.0	84.0	168.0	168.0	168.0	168.0	168.0	168.0	168.0	168.0	168.0
60	16.8	42.0	42.0	84.0	84.0	84.0	84.0	84.0	84.0	84.0	84.0	84.0
61	0	0	0	0	0	0	0	0	0	0	0	0

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6.2. Continuous charge current matrix (unit:A)

SOC /°C	0%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	95%	98%	100%
-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	16.8	16.8	16.8	16.8	16.8	16.8	16.8	16.8	16.8	16.8	0	0	0	0
5	33.6	33.6	33.6	33.6	33.6	33.6	33.6	33.6	33.6	33.6	0	0	0	0
10	50.4	50.4	50.4	50.4	50.4	50.4	50.4	50.4	50.4	50.4	33.6	0	0	0
15	84	84	84	84	84	84	84	84	84	84	50.4	33.6	33.6	33.6
20	168	168	168	168	168	168	168	168	168	168	84	84	84	84
25	168	168	168	168	168	168	168	168	168	168	84	84	84	84
30	168	168	168	168	168	168	168	168	168	168	84	84	84	84
35	168	168	168	168	168	168	168	168	168	168	84	84	84	84
40	168	168	168	168	168	168	168	168	168	168	84	84	84	84
45	168	168	168	168	168	168	168	168	168	168	84	84	84	84
50	126	126	126	126	126	126	126	126	126	126	84	84	84	84
55	84	84	84	84	84	84	84	84	84	84	84	84	84	84
56	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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6. 3. Pulse discharge current matrix (unit:A)-60s

SOC/°C	0%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
-31	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
-30	0.0	0.0	0.0	16.8	33.6	50.4	84.0	84.0	84.0	84.0	84.0	84.0
-25	0.0	0.0	16.8	33.6	33.6	50.4	84.0	84.0	84.0	84.0	84.0	84.0
-20	8.4	16.8	33.6	50.4	84.0	84.0	84.0	84.0	84.0	84.0	84.0	84.0
-15	8.4	28.0	33.6	50.4	84.0	105	105	105	105	105	105	105
-10	16.8	33.6	50.4	84.0	140	140	140	140	140	140	140	140
-5	16.8	50.4	84.0	84.0	140	140	140	140	140	140	140	140
0	16.8	84.0	84.0	105	140	140	140	140	140	140	140	140
5	16.8	84.0	84.0	168	168	168	168	168	168	168	168	168
10	16.8	105	140	210	210	210	210	210	210	210	210	210
15	16.8	105	140	210	210	210	210	210	210	210	210	210
20	16.8	105	140	280	280	280	280	280	280	280	280	280
25	16.8	105	140	280	280	280	280	280	280	280	280	280
30	16.8	105	140	280	280	280	280	280	280	280	280	280
35	16.8	105	140	280	280	280	280	280	280	280	280	280
40	16.8	105	140	280	280	280	280	280	280	280	280	280
45	16.8	105	140	280	280	280	280	280	280	280	280	280
50	16.8	105	140	280	280	280	280	280	280	280	280	280
55	16.8	105	140	280	280	280	280	280	280	280	280	280
60	16.8	52.5	70.0	140	140	140	140	140	140	140	140	140
61	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

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6. 4. Pulse charge current matrix (unit:A)-60s

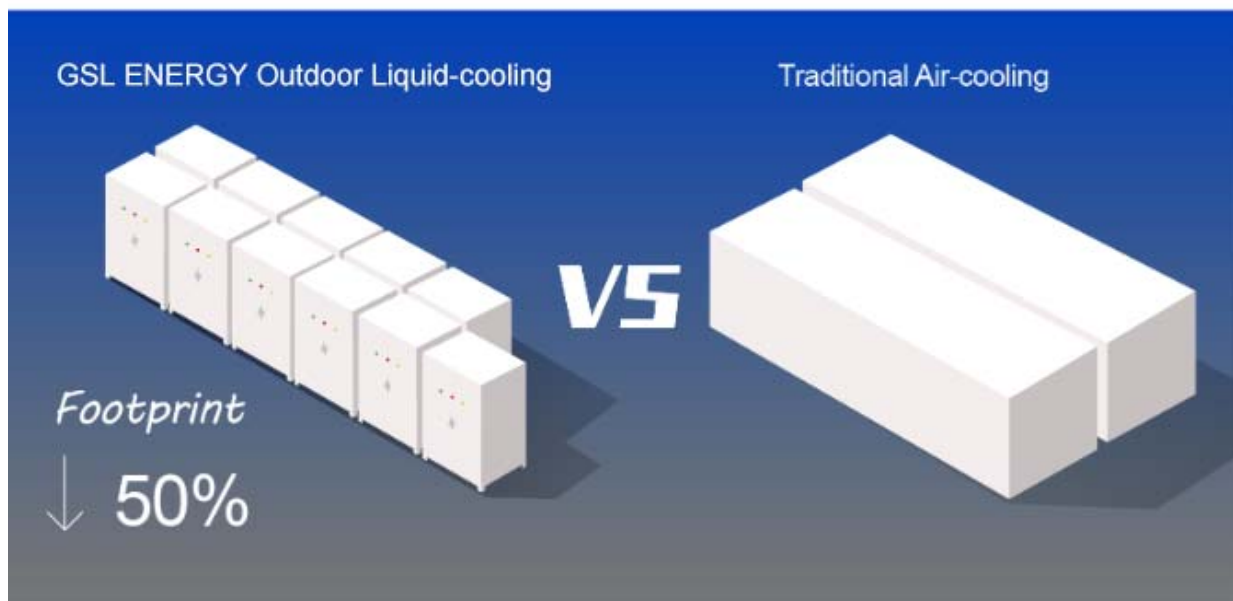
SOC/°C	0%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	95%	98%	100%
-1	16.8	16.8	16.8	16.8	16.8	16.8	16.8	16.8	16.8	16.8	16.8	0	0	0
0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	0	0	0
5	42.0	42.0	42.0	42.0	42.0	42.0	42.0	42.0	42.0	42.0	42.0	0	0	0
10	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	42.0	0	0
15	140	140	140	140	140	140	140	140	140	140	140	70.0	0	0
20	210	210	210	210	210	210	210	210	210	210	210	140	0	0
25	280	280	280	280	280	280	280	280	280	280	280	140	0	0
30	280	280	280	280	280	280	280	280	280	280	280	140	0	0
35	280	280	280	280	280	280	280	280	280	280	280	140	0	0
40	280	280	280	280	280	280	280	280	280	280	280	140	0	0
45	280	280	280	280	280	280	280	280	280	280	280	140	0	0
50	280	280	280	280	280	280	280	280	280	280	280	140	0	0
55	210	210	210	210	210	210	210	210	210	210	210	140	0	0
56	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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7 Advantage



8 Application

FULL RANGE COVERAGE



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9 Shipment Status

The SOC of this product is $27\% \pm 3\%$. When this product is shipped, the manual disconnecting devices of all power circuits will be disconnected to ensure safety during transportation. There are two modes of transportation: (1) assembly transportation; (2) Split transportation (transport the bat. pack separately and install other parts in containers for transportation)

10 Product packaging, Transportation and Storage

Product packaging, storage and transportation shall meet the relevant requirements of GB/T 36276-2018, UN38.3

10.1. Product Packaging

No additional packaging for cabinet products.

Module packaging requirements are as follows:

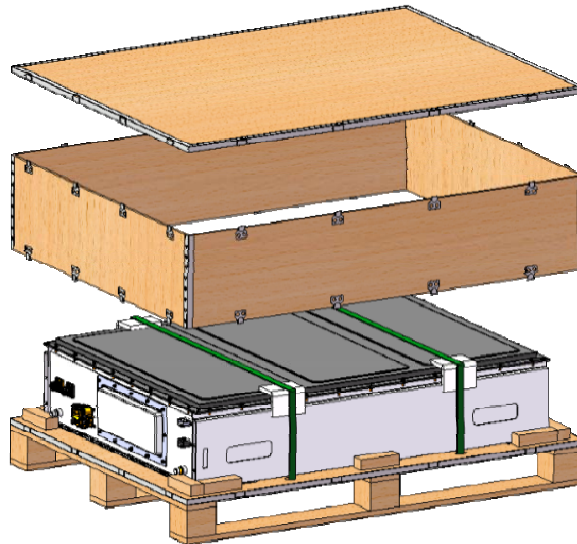


Fig.12-1 Packaging for battery module

The limit blocks at the four corners of the pallet are used to fix the battery module horizontally, and the straps are used to fix the battery module vertically.

Gross weight after packing	360kg
External dimensions of packing	1210mm×920mm×260mm
Stack height limit	3 layers
Material execution standard	GB/T 24311, Class 1 level

10. 2. Product Transportation

Cabinet assembly transportation shall meet relevant requirements of UN3536;

The special lifting point of the cabinet assembly is located at the bottom or top angle iron, and the load capacity of the lifting equipment meets the requirements;

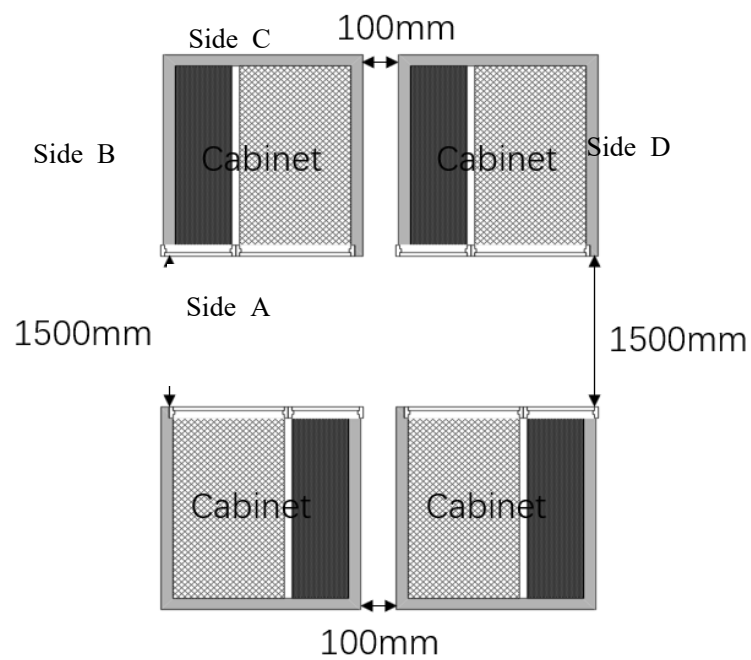
The battery module shall be prevented from inversion, violent vibration, external force impact and extrusion during transportation;

The battery module shall be protected from exposure to the sun, rain, collision, extrusion, falling, rolling, etc. during transportation. It can be transported by trucks, trains, ships and other means of transportation.

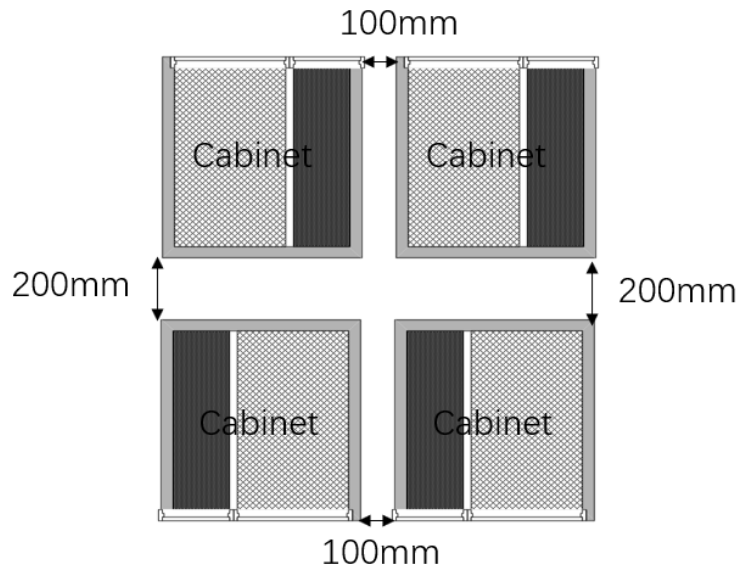
Products must be stored away from fire and heat sources. It is recommended to adjust to 25%~40%SOC before storage. If static storage is required for more than two months, perform maintenance every two months.

11 Installation

Recommended cabinet installation:



Face-to-face arrangement (Top view)



Back-to-back arrangement (Top view)

Note:

- 1) Refer to the above figure for container foundation, and the recommended foundation height shall be $\geq 300\text{mm}$, and the foundation horizontal height difference shall be $\leq 3\text{mm}$;
- 2) The grounding bar is located on the bottom crossbeam of side A and side B, with 4 places in total, and each place is connected to the grounding network with 2 M8 bolts;
- 3) It is recommended that Side A, Side B, Side C, and Side D should be more than 10ft (3.048m) away from adjacent buildings, with A spacing of 1500mm between Side A and Side A, and A spacing of 1500mm between Side C and Side C.
- 4) See the installation and maintenance manual for other installation contents.

12 Warranty Statement

The warranty period of the products depends on the commercial contract. During this period, if safety, performance degradation, abnormal attenuation and other problems are not caused by the manufacturer's design, manufacturing process and quality control, GSL ENERGY can only provide technical consulting support and paid replacement or maintenance services, but does not promise to provide free repair and replacement services.

Do not disassemble the battery box and accessory parts without the permission of GSL ENERGY. In case of customer's unauthorized disassembly, GSL ENERGY will not bear the relevant accident liability and quality assurance services.

GSL ENERGY does not assume any responsibility for the following problems and accidents caused by the operation of unauthorized personnel and abnormalities other than the product itself:

Problems and accidents arising from violations of regulations, industry standards, technical agreements, safety guidelines and use restrictions described herein.

During installation and use, exceptions are not caused by the actions of GSL ENERGY.

Problems arising from improper use of electrical devices in combination with the product.

Beyond the boundary of the battery performance index.

Connect the product directly with battery products of other types, models and manufacturers.

Modification of the product without permission of the manufacturer.

13 Guidelines and Use Restriction

13.1. Product Guide

To avoid battery damage or personal injury caused by misuse of lithium-ion battery products, please read the following safety guidelines carefully before using lithium-ion batteries:

Improper use and storage of batteries may cause fire, explosion and burn. Do not decompose, do not crush, do not incinerate, do not heat or throw batteries into fire.

If batteries need to be replaced, use batteries from the same manufacturer. Mixing batteries from different manufacturers may cause performance deterioration, and even risk of fire and explosion.

Do not immerse the battery in water or allow it to get wet.

Do not short-circuit, overcharge or over discharge the battery.

Do not install, use or store battery storage devices near heat sources (such as fire or heater).

Do not pierce the battery shell. Do not hit, throw, strike, trample, weigh or roll the battery.

Do not dismantle, repair or modify battery products in any way without authorization.

If the battery emits peculiar smell, heat, deformation, discoloration, or any other abnormal phenomenon, stop using the battery immediately and transfer the abnormal battery component to the emergency disposal site.

If the battery catches fire, cut off the high and low voltage circuit immediately and use dry powder fire extinguisher or sand to extinguish the fire. If water is used for fire extinguishing, be sure to use an absolutely sufficient amount of water for a long time. It is strictly forbidden to use an insufficient amount of water to sprinkle battery devices.

13.2. Product Safety Conditions for Use

The customer shall ensure strict compliance with the following battery application conditions:

The product should be equipped with a reliable battery management system to closely monitor, manage and protect each battery. Complete monitoring data of battery operation shall be kept for reference and quality responsibility division.

It is forbidden to dismantle the battery unit, modify or change the design and architecture of the battery management system without the consent of GSL ENERGY, so as not to affect the performance of the battery.